

ROCHESTER INSTITUTE OF TECHNOLOGY

NEW DEGREE PROGRAM PROPOSAL
BACHELOR'S OF SCIENCE (BS) DEGREE
in
INTEGRATED SCIENCE AND ENTREPRENEURSHIP

Offered by

The College of Science
and
The Saunders College of Business

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Glossary of Acronyms

(AAS) Associate of Applied Science

(BS) Bachelor of Science Degree

(COLA) College of Liberal Arts

(COS) College of Science

(DAS) NTID's Department of Access Services

(d/hh) deaf and hard-of-hearing

(GCCIS) B. Thomas Golisano College of Computing and Information Sciences

(HLC) Hugh L. Carey

(ICS) Information and Computing Studies

(ISE) Integrated Science and Entrepreneurship

(IST) Information Sciences and Technologies

(NTID) The National Technical Institute for the Deaf

(NYS) New York State

(RIT) Rochester Institute of Technology

(SCB) Saunders College of Business

(SOIS) School of Individualized Studies

Program Description and Purpose

A. Program Description

1. Overview

Today, science impacts almost every aspect of society. In order to join tomorrow's workforce, graduates need to be versatile and adaptable. Managerial positions in science-oriented industries require the integration and understanding of relevant scientific principles with basic management skills. Moreover, today's scientists need a variety of entrepreneurial skills in order to thrive in the workplace. The Integrated Science and Entrepreneurship (ISE) degree program is designed to equip students with the skills necessary to compete and prosper in the new science and technology-intensive business work place.

The ISE degree program combines science and entrepreneurship into an interdisciplinary degree program. Unlike a typical double major wherein students independently complete requirements for both programs, the ISE degree program blends the two curricula together using courses such as entrepreneurship for scientists, the use of social media, team management, co-ops, negotiating, and marketing. Moreover, as topical courses become available, ISE students will be encouraged to consider taking courses on motivating teams and organizational behavior. As part of the ISE degree, the students must complete two co-ops, one in a traditional science laboratory environment, and one in a business-focused environment that includes the integration of scientific innovation and customer, cost, and timeline constraints.

The fusion of a classical science major with the critical foundational elements of a business degree is preparation for a very broad range of careers, both within and outside science. The ISE degree program prepares students for careers as (for example) entrepreneurs, scientists starting new businesses, managers operating in science-based industries, technical marketing and sales, and project or program directors within companies. The ISE program breaks down traditional disciplinary barriers and provides students with preparation in any of the core scientific disciplines while adding an array of relevant business courses that prepare the students for science in the business world. The curriculum employs existing courses in STEM disciplines combined with business and entrepreneurship courses to enable its graduates to guide development and deployment of scientific knowledge in a business setting.

B. Educational and Career Outcomes

- 1. Educational Outcomes** as recommended by the RIT Student Learning Outcomes Assessment Office:

Program Goals & Associated Student Learning Outcomes:

Graduates of the ISE degree program will be able to:

1. Create effective solutions:
 - Students analyze real world problems in their elected science or math track.
 - Students derive and articulate effective solutions to problems by employing their combined knowledge of science and entrepreneurship.
2. Create effective multidisciplinary teams:

- Students direct and manage teams of people from various science and business backgrounds in brainstorming, approach selection and project organization.
3. Use best practices in planning and execution of the interdisciplinary team:
 - Students implement and refine procedures in the continued operation of a multidisciplinary team.
 4. Use technology appropriate for the chosen science or math fields:
 - Students evaluate and select appropriate technology tools for managing the science and the operation of the interdisciplinary team.
 5. Use entrepreneurial skills:
 - Students are able to write a preliminary business plan for a startup
 - Students offer solutions for business problems faced by startup companies.
 - Students successfully complete a senior capstone project in which they synthesize business principles with their chosen STEM discipline as part of a solution of a real world problem.
 6. Utilize effective professional communication and collaboration skills:
 - Students demonstrate effective verbal and written communication skills.
 - Students work effectively as a member of a team.
 - Students maintain a balance between integrated science and entrepreneurship.

2. Career Outcomes

Career Education:

This program offers students a flexible education that includes training in a science or mathematics discipline, combined with an education in business and project management. In addition to the science education in their selected discipline, each student will take courses that span the pillars of entrepreneurship, including such topics as finance, organizational management, negotiating, writing a business plan, techniques of raising capital, intellectual property protection, and the principles of licensing. ISE students are required to complete two co-op assignments during their education, one in business and one in their technical field. These experiences are synthesized through capstone courses in their senior year. The skills attained will prepare students to take on roles as project managers and directors in science or engineering based companies, CEOs (Chief Executive Officers) and CTOs (Chief Technology Officers) in startup and other high tech companies, and as science and technology strategists or technical marketing and sales executives in all sizes of companies.

Assessment of the Program level goals are shown below in Table 6. Briefly, each student's progress towards the degree and their concomitant acquisition of skills will be measured periodically throughout their education. Student Learning Outcomes for both the business and science aspects of the degree education will be assessed using the measurements outlined in the table. Specifics regarding the measurement metric used, the benchmark, timeline, and owner are also listed.

Critical Thinking and Analytical Skills:

Entrepreneurship of new and emerging technologies presents a diverse set of challenges that require refined critical thinking skills. Students in the ISE program will learn the analysis of problems, the formulation of the best solution, and the management of multidisciplinary teams to implement that solution. Table 6 outlines which measurements will assess critical thinking and analytical skills that the students acquire through the course of their education towards their degree.

Excellence:

Students in this integrated degree program will develop a balanced proficiency in science and business, and will enter the marketplace with a distinct experiential and educational advantage over more conventionally educated students.

Community and Personal Growth:

Communities need leaders who have skills in critical thinking, scientific and mathematical analysis, and business. Students with these leadership skills can have significant community impact in businesses of all sizes, from startups to large corporations. However, in a classic college education, students often are not aware of organizational or leadership talents they may possess until they are placed in an environment that allows these talents to flourish. Courses in the proposed BS program not only foster the growth of these skills, but they encourage their development in situations that combine knowledge of their specific science or mathematics discipline with leadership and program management through a senior capstone project. This capstone project will allow students to clearly demonstrate their leadership and management abilities to employers in an opportunity not as readily available to double major students.

As undergraduates in the ISE program, students will apply their skills to entrepreneurial challenges while still enrolled at RIT through two required co-op positions during the last two years of their education. An ISE support community for ISE students using social media will create a natural environment for sharing experiences with their classmates during and after their formal RIT education. These communities of cohorts will enhance both their personal and professional growth and will provide an evolving set of shared skills that will benefit the communities with which the graduates are engaged.

Lifelong Learning:

The combination of the excitement of discovery (provided by the science component of ISE) and the satisfaction of accomplishment (provided by the business component of the program) will foster a desire for learning that should continue long after graduation from RIT. As students tackle real world problems in the program (through their co-op and capstone experiences), they will probably be exposed to new areas of science and management. Since these tools will be used by the students in their studies and subsequent employment, they will have continual opportunities to learn new science and new skills throughout their careers. ISE graduates will be prepared to be lifelong learners and will be prepared to learn on their own after they graduate. The social groups created during participation in this program, combined with the accessibility of colleague support through various electronic pathways, will establish an environment in which our graduates can learn additional skills throughout their lifetime.

C. The Program Fit with the RIT Mission, Vision, Values and Reputation.

The ISE program is consistent with the missions of the university and the partnering colleges by focusing on an emerging area of science and business to which graduates will be able to contribute their creative products and faculty will be able to pursue new directions of scholarship.

From the RIT Mission Statement:

“RIT’s mission is to provide a broad range of career-oriented educational programs with the goal of producing innovative, creative graduates who are well-prepared for their chosen careers in a global society.

We rigorously pursue new and emerging career areas. We develop and deliver curricula and advance scholarship and research relevant to emerging technologies and social conditions.”

The ISE will be a new, interdisciplinary, and innovative addition to the RIT education portfolio that will allow students to earn a bachelor’s degree in integrated science and entrepreneurship with a concentration in their specific science or mathematics discipline. Program faculty will work collaboratively with industry partners to develop stimulating projects and foster experiential learning through capstone projects and co-op experiences. Students will be well prepared to meet the challenges in positions such as (for example) entrepreneurs, scientists starting new businesses, managers operating in science-based industries, and project or program directors within companies. The degree program will also enable students to complete the requirements for graduate study in order to pursue an advanced degree in their discipline.

Innovative and Creative

This is one of the few integrated science and business bachelor’s degree programs offered nationwide. Courses offered in this program will prepare students by engaging them in learning experiences that usually are only obtained through growth in the work environment. These experiences will involve invention, negotiation, program management, budget management, and entrepreneurship. This innovative, immersive and integrated approach will open job opportunities for our students unavailable to students with conventional bachelor’s degrees. Through collaboration with RIT’s School of Individualized Studies (SOIS), students will learn the principles of integrative studies, and will have opportunities to share their experiences with classmates in similar integrated programs.

Experiential and Well-prepared

Experience is a cornerstone of a prepared graduate. ISE students are required to complete two co-op assignments during their education, one in business and one in their technical field. These experiences are synthesized through capstone courses in their senior year. These industry experiences will provide the opportunity to create and implement real-world solutions to industry problems in capstone and co-op experiences. This collaborative and experiential learning environment will provide students with a real-life learning environment to better prepare them for the workplace of the 21st century.

A learning support community established for each new cohort of students will allow faculty and students to work together on both in-class and out-of-class activities and promote peer support. A shared course on Integrated Studies will further strengthen the preparation and skills of the ISE graduates.

Synergistic, Collaborative, and Interdisciplinary

The ISE program is interdisciplinary by nature, integrating studies in a student's chosen discipline from within the College of Science with a selection of carefully chosen courses from the Saunders College of Business. Collaboration with SOIS on integrative studies will further serve to enable students to create a balanced integrated program between the two colleges by educating them in the science of multidisciplinary education.

The program provides for lifelong learning opportunities through a synergistic balance of technical credits, business credits, and arts and science credits that prepare students to work in a changing global community.

D. Justification and Need for this Program and how it Contributes to RIT's Strategic Plan Priorities and Key Result Areas

From the RIT Strategic Plan:

“Our mission is to provide technology-based tracks for personal and professional development. We rigorously pursue new and emerging career areas. We develop and deliver curricula and advanced scholarship relevant to emerging technologies and social conditions.”

The strong growth in entrepreneurship endeavours, combined with the faltering ability of large corporations to innovate¹, creates an ideal market for students with an ISE degree who are entering the workforce. As described in the Kaufman Index of Entrepreneurial Activity², large companies focus on enabling established technologies to satisfy customer needs. Small innovative companies, in contrast, innovate specifically for the purpose of creating a viable business model. They must fuse science, creativity, and business knowledge in order to develop marketable new technologies based on scientific innovations. They are critically dependent on the success of this fusion. In short, small companies must innovate to survive, whereas large companies tune their existing business to get better returns. Start-up companies need employees who can lead and who understand both the science and business aspects of a start-up company. Large corporations need innovators and employees who can manage the development of innovations starting with the core team. For large corporations, the luxury of training such leaders through on-the-job experiences is gone. Such companies need people who can walk in the door and perform from day one. The ISE prepares students for these positions by giving them both the education and the hands-on experiences of growing new ventures.

Over the past decade there has been a steadily increasing growth in the number of science and technology startups. According to the Kaufman Index of Entrepreneurial Activity², the rate of creation of entrepreneurial endeavors is growing at a rate above the

¹ <http://steveblank.com/2013/02/23/why-big-companies-cant-innovate/>

²

http://www.kauffman.org/~media/kauffman_org/research%20reports%20and%20covers/2015/05/kauffman_index_startup_activity_national_trends_2015.pdf

peak seen during the dot.com era. This rate further validates the expected demand for students with this degree.

In addition to the vibrant entrepreneurial market, there is growing evidence to support the assertion that integrated curricula that merge science and management education increases the job flexibility of graduates. By enabling these graduates to interpret complex situations from a holistic perspective, they will enjoy greater career options in the future.

Professor Orit Hazzan, Dean of the Faculty of Education at the Technion – Israel Institute of Technology, asserts that any undergraduate science and engineering program should contain some elements of three meta-professions³ - Management, Education and Research. Together these create the MERge pedagogical model. Hazzan says "... skills that are not sufficiently covered in most traditional science Ph.D. programs are highly valued in many non-lab positions." Specific skills cited by Hazzan include:

- Communications skills, particularly the ability to explain complex scientific concepts to diverse audiences.
- Listening, a skill that is critical in understanding how the application of science can help meet the needs of others.
- An understanding of people: how to recognize their strengths and shortcomings, to motivate them to achieve their best, and to assemble diverse teams that achieve what no individual could ever accomplish.

These elements are all key components of the education being proposed in the ISE degree program.

Career Placement and Career Paths

The ISE degree program prepares students for their careers by providing an educational experience that combines a STEM education with the people and financial skills needed for success in science and technology businesses. Skills developed within the ISE degree program will include an education in their chosen STEM discipline as well as education in finance, technology management, leadership, negotiation, and project management. The co-op positions required as part of the ISE degree include both science and business assignments. These experiences will provide the students with a working knowledge of science and business environments. The skills learned in these co-ops as part of the ISE degree program will provide them with technical and people tools needed to begin contributing to a future employer shortly after beginning. The fusion of a classical science discipline with the critical foundational elements of a business degree is perfect preparation for a very broad range of careers, both within and outside science.

The majority of the graduates of this program will be well positioned for jobs in companies that need program management talent with a solid preparation in the sciences. With this degree, students will be prepared to take on roles in a variety of positions, such as project managers and directors in science or engineering efforts, leadership positions in startup and other high tech companies, technical sales managers, and technology strategists in all sizes of companies.

³ http://edu.technion.ac.il/Faculty/OriTH/HomePage/MERgeModel_Hazzan_July2015.pdf

The ISE degree program responds to employment opportunities in the new and emerging career areas that require both science and business training. A similar program at LaSalle University⁴ lists the following program outcomes for its BS degree in Integrated Science, Business and Technology:

ISBT majors have gone onto **graduate programs** in the following disciplines:

Graduate School Programs

- Biotechnology
- Chiropractic Medicine
- Computer Science
- Forensics Science
- Information Technology Leadership
- Molecular Immunology
- Optometry
- Pharmacy
- Public Health
- Public Health/International Health

They also hold **positions** in the following areas (See Appendix B for representative median incomes for these positions):

Corporate Management

- Leadership Development Program, Johnson & Johnson
- Leadership Development Program, GlaxoSmithKline
- Merchant Program in Pharmacy, Wal-Mart Stores, Inc.
- Operations Manager, Delta Geophysics Inc.
- Program Director, GlaxoSmithKline
- Sr. Marketing Associate, Digitas Health
- Store Leadership Program, Home Depot USA, Inc.
- Supervisor – Field Automation Specialists, DHL

Project Management

- Analyst, Johnson & Johnson Consumer Group of Companies
- Assistant Contractor, Lawrence Contracting
- Project Manager, ALZA Corporation of Johnson & Johnson
- Project Manager, Fieldwork International
- Project Analyst, UnitedHealth Group
- Real Estate Project Manager, Watchdog
- Research Services Analyst, Consumer Health Sciences
- System Analyst II, Robert – Kohler Company

Corporate Analysis

- Analyst, Johnson & Johnson
- Associate Analyst, Johnson & Johnson
- Associate Systems Analyst, Pactiv Corporation
- Energy/Marine Underwriter, Navigators Group
- Export Logistics Coordinator, BDP International, Inc.
- Financial Services Professional, New York Life
- Logistics Specialist, Life Cycle Engineering
- Program Analyst, U.S. General Services Administration
- Sr. Procurement Analyst, Sunoco Inc.
- Sr. Regulatory Associate, Octagon Research Solutions
- Systems Analyst, Siemens Medical Systems

Research and Development

- Cell Culture Associate, GlaxoSmithKline
- Manufacturing Associate II, Tengion

⁴ <http://www.lasalle.edu/isbt/outcomes/>

- Quality Assurance Associate, Gemin X
- Research Support Specialist, Stony Brook University
- Scientist, GlaxoSmithKline
- Scientist, National Medical Services Labs
- Upstream Associate, AppTec Laboratory Services

Production

- Brewer, Philadelphia Brewing Company

University of Wisconsin Whitewater⁵ shared with us that they place 100% of their graduates from their program (which is similar to this proposed degree program), and graduate between 15-20 per year. Their graduates similarly obtain jobs in a wide range of fields, and they report that their graduates are able to secure highly competitive positions in these science and technology businesses.

1. Student Success

Students in the ISE program will experience through:

- student and faculty engagement in a learning support community
- student, faculty and industry collaboration in the capstone course
- student and faculty interaction in scholarship opportunities
- real-world experience with industry partners offered through co-op
- interdisciplinary guidance and counseling provided by RIT's School of Individualized Studies

2. Innovation, Creativity, Research and Scholarship

The ISE program by its very nature fuses these four elements into one coherent education. Research will be a required component of the capstone project, which will synthesize the entrepreneurial skills of the students with their scientific background. Innovation and creativity (and the management thereof) will be cornerstones of the degree program, since each student will take courses on these topics. Moreover, students will be required by the innovation courses to learn the process of innovation as it applies to their particular scientific discipline. Students will exercise skills that they have acquired in project management, business operations, team and project management, negotiation, and scheduling.

3. Organizational/Operational Excellence

The program will be assessed by both RIT's comprehensive assessment review and evaluation as described in Table 6 below, and will use the results to develop strategies and tactics for program improvement.

4. Stakeholder Satisfaction

There will be several opportunities to assess stakeholder satisfaction including

- Students in the ISE program will be asked annually about their satisfaction with their education in:
 - their selected COS discipline,
 - the Saunders College of Business,
 - the ISE program itself
- Co-op employers will assess students at the end of the required co-op in the summer between their fourth and fifth semester.
- Faculty or partners from whom we get capstone projects will assess satisfaction with the student work at the end of the capstone course.

⁵ <https://www.uww.edu/cls/integrated-science-business>

The results of the surveys will be reviewed annually by the COS director of ISE within the College of Science. Corrective action, where appropriate, will be coordinated with the related STEM discipline within COS and with the participating program faculty from the Saunders College of Business. Academic planning will be provided by the College of Science through the ISE program faculty and staff.

E. The Curricular Features of the Program

1. Facilitate and Support Student and Faculty Scholarship, Research and Creativity

The curriculum requires a capstone project in which the student must integrate his/her chosen science/math track with the skills learned in project management. Several aspects of project management include creativity, scholarship and research, including, for example, brainstorming, approach evaluation and selection, research and development, product design, and business structure. The education provided by the program, combined in the capstone project with the tools learned in project management, offers the students first-hand experience in the creation and nurturing of research and creativity.

2. Address Emerging Disciplines

The ISE program directly enables the study of emerging disciplines through its use of science and business electives. New research areas that lie between two or more different existing disciplines often grow into new areas of study. The ISE degree program offers students the opportunity to develop a curriculum that is customized to enable study in such interstitial fields through the judicious use of science electives that are built into the degree. Mentoring and guidance by faculty within the Colleges of Science and Business and program faculty within the ISE program itself will assure that students take goal-oriented courses as part of their elective choices.

The integration of science with entrepreneurial skills in the ISE program will produce graduates who are highly adaptable and able to guide innovative ideas from conception to final production. The diverse skills learned in both science and business will be reinforced through a required participation in two co-ops, one dominated by science and one by business. These skills will further be synthesized in the senior capstone course, required of all majors.

New disciplines, such as imaging science, for example, often arise from the application of new technologies to a business opportunity. For example, bioimaging, which was not a discipline until the award of a recent Nobel Prize, is currently growing into its own science discipline. The proposed program enables and encourages students to focus on the leading edge of emerging technologies that might lead to new disciplines. The flexible nature of the curriculum and the program focus on leading edge technologies, reflected in the capstone project, encourages students to directly engage in emerging disciplines. The degree program provides a foundational set of tools and skills that can be directly applied to emerging technologies. Graduates of the program will be well prepared to engage and manage projects in new and emerging areas.

F. Curricular Interconnections and Integration with Other Disciplines, Programs and Colleges at RIT

The ISE curriculum will be one that integrates courses from COS and SCB. The ISE program is built on already existing interdisciplinary collaborations and courses, plus two new capstone courses. These collaborations cross departments, disciplines, and colleges and include special topics on ethics, legislation, negotiation, personnel management, and business. By its nature, the ISE program is collaborative and integrative, providing the student with tools necessary to manage projects and programs in a business, while exercising a technical command of their science or mathematics discipline. The education of students within the program demands a fusion of the separate types of knowledge they obtain across the colleges, so that they are prepared to enter the workforce with a balance of both science and business skills.

The ISE includes a requirement for two co-operative (co-op) assignments (usually taken during the summers before the junior and senior years) which will provide students with an experiential foundation upon which balanced, integrated programs can be built.

The program is made up of a core set of required courses in business totaling 24 credit hours, and a foundation of required courses in their selected science track (the precise number of core credit hours will vary from science discipline to discipline). Students will work with their advisors and mentors to complement the science foundation with science track electives in order to achieve the required 24 credit hours in their selected science/math track and a minimum of 24 credit hours in business. ISE Students will also take 61 credit hours of general education, 6 credit hours of capstone and 6 credit hours of open electives, to achieve a minimum required 121 credit hours for graduation. These courses are intended to give students:

1. A broad, practical foundation in the business aspects of scientific endeavors through education in finance, management, and entrepreneurship;
2. An education in their science or mathematics discipline, with sufficient depth to be able to manage a project and maintain a degree of the required science understanding;
3. A practical, hands-on exploration of their skills as project managers through a carefully crafted individual capstone project;
4. Field experiences in both the selected science and in business, through a requirement of two co-op experiences during the course of their ISE education. Students are required to complete two co-op experiences, one with a science emphasis, and the other with a business emphasis.

Students will have the opportunity to select minors from a broad selection of minors across RIT. Finally, the program will partner with campus resources like SOIS, the Wallace Center, the Cary Graphic Arts Collection, the RIT Press, the Vignelli Archives, and the Simone Center for Entrepreneurship to enhance research, scholarship, and publication.

G. Role of Faculty in the Program's Design

The proposed ISE degree was proposed by the leadership team of the College of Science in conjunction with specific faculty and the Dean of the Saunders College of Business. Several faculty members from both colleges as well as the School of Individualized Studies provided expertise in developing and reviewing proposed courses. Faculty from the College of Science and the Saunders College of Business reviewed the full program proposal along with the new courses and provided feedback.

H. Input by External Partners

The COS Advisory Board reviewed and approved the proposed ISE program. This board is composed of five representatives from both local and international technology businesses. In addition, six faculty members from schools in the College of Science and the Saunders College of Business reviewed the proposal and the curriculum.

The curriculum advisory board members who reviewed the ISE proposal are listed below. Their qualifications and position titles are summarized below.

Name	Title	Organization
Jeffrey Harris	COS Advisory Board	Xerox Corporation
Kenneth Reed	RIT Trustee and COS Advisory Board	KJR Materials Technology Consulting
Nancy Fein	COS Advisory Board	Toyota Corporation
James Hall	Director	School of Individualized Study, RIT
Robert Loce	COS Advisory Board	Xerox PARC
Ted Dziuba	COS Advisory Board	Entrepreneur

After reviewing our program and curriculum plans with them, the advisory board provided input that was generally very positive and helpful. Their comments are captured in their individual external letters of support (reproduced in External Letters of Support, **Appendix D**). We were able to use their input to make program improvements that are reflected in the program mask, course descriptions and course outlines. Additionally, James Hall was eager to offer assistance in both a collaborative and an advisory role. (See Internal Letters of Support in **Appendix C**).

I. Enrollment Projections for Year 1 through Year 5

Several sources were consulted in order to prepare a realistic enrollment projection for the ISE program. Enrollment Management at RIT provided their enrollment projections (see **Appendix G**). Their research suggests that the program might expect an enrollment of 10 students the first year, growing to a total enrollment of 55 by Year 5. This indicates a net growth of 10 percent over the first five years.

There are a few programs in Integrated Science around the country. Some of them integrate multiple sciences while others integrate science with business. Information published by these programs provided a second source of enrollment projection and validation. In addition, the directors of these programs were contacted directly and asked to share their experience with the enrollment and growth of their programs. To summarize the salient information from these external sources, Virginia Tech confirms an enrollment of 48 after 5 years, with an initial enrollment of 12. South Eastern Louisiana University reported a steady enrollment between 20 and 30 per year, including their first year. James Madison University has the largest program by far, with a sustained enrollment of over 100 per year.

University of Washington shared their enrollment numbers, but their program has very high GPA admissions standards. They only admit students to the major after the first 2

years of coursework. They report 5 students enrolled in the first cohort, with 10 scheduled for the second.

In light of the information provided by Enrollment Management at RIT and the comparable schools, we used their estimates for the program enrollment. It is assumed that the first freshman class will have 10 students and that subsequent freshman classes will have 12. Using the RIT standard values of 87.64% year-to-year retention rate and an overall 66.32% graduation rate after 4 years, the model produced the table shown below with a steady state of 27 students in the program each year.

Detailed model information can be found in the budget model in [Appendix G](#).

Program Courses and Schedule

ISE students will pursue and complete a bachelor's degree by completing a minimum of 121 credit hours of study as approved by the ISE program (the specific credit hour count will be determined by the student's selected science or math track, in consultation with and the approval of the ISE staff). Students accepted into the ISE will be assigned an advisor in their primary COS discipline and an academic advisor in the ISE. They will complete the University's General Education requirements while pursuing their degree per University guidelines.

a) Required and Elective Courses in the Program

ISE Credit Summary

- GRADUATION Requirement = at least 121 credits
 - Science Component = at least 24 credits / approximately 8 courses
 - Completion of the required coursework in the selected discipline
 - The specific credit hour requirement may vary from science discipline to discipline, but will always be at least 24 total credit hours
 - Business Component = 24 credits / approximately 8 courses
 - 24 credits of required courses, 3 non-business open elective credits
 - General Education Components = 61 credits
 - Open Electives = 6 credit hours – NOTE: these Open Electives must be OUTSIDE the Saunders College of Business
 - Two co-ops – one in a related science field, and one in a business environment
 - Capstone = 6 credit hours

Students in the ISE program will complete a minimum of 24 credits towards a preapproved course of study in the sciences and/or mathematics within the RIT College of Science, a minimum of 24 credit hours in the Saunders College of Business, 6 credits of open electives, 6 credits of capstone, and 61 credits of General Education. The business open elective can be any 300 or above level undergraduate business course that does not require additional pre-requisite courses. The specific science/math and business courses beyond the required foundational courses will be chosen as electives by the student in consultation with the science/math program and ISE program office.

Students will also be required to complete two co-op experiences. Direct experience is a proven educator of “people” skills. Working in an environment that is representative of the specific science and business combination being pursued by a student will not only enable the development of appropriate interpersonal skills needed in the workplace, but it will also

foster an appreciation of the nature of the work environment and the problems being encountered in a relevant area. ISE students are required to complete two semesters of co-op education, one with a science emphasis, and the other not in a traditional science research laboratory.

Required (foundational) courses from the Saunders College of Business, totaling 24 credit hours:

Course number	Title	Credit Hours
ACCT-110	Financial Accounting	3
FINC-220	Corporate Finance	3
MGMT-215	Organizational Behavior	3
MKTG-230	Principles of Marketing	3
MGMT-470	Applied Entrepreneurship/Commercialization	3
MGMT-350	Entrepreneurship	3
MGMT-150	The World of Business	3
DECS-310	Operations Management	3

The ISE students will also have 1 additional 3 credit hour business elective. Students in the ISE program will complete a maximum of 27 credit hours of study in the Saunders College of Business. The specific courses will be preapproved by the ISE upon acceptance of a student into the program.

b) Courses in Table 1a that satisfy RIT's General Education Framework

The following general education courses are part of Table 1a:

1. Foundation Courses

- a. LAS courses and electives throughout the program
- b. UWRT-150 FYW: Writing Seminar

2. Perspectives for BS Degree

- a. LAS- Perspective 1 (Ethical)
- b. LAS- Perspective 2 (Artistic)
- c. LAS- Perspective 3 (Global)
- d. LAS- Perspective 4 (Social)
- e. LAS- Perspective 5 (Natural Science Inquiry)
- f. LAS- Perspective 6 (Scientific Principles)
- g. LAS- Perspective 7a (Mathematical)
- h. LAS- Perspective 7b (Mathematical)

3. Immersion

- LAS- Immersion 1
- LAS- Immersion 2
- LAS- Immersion 3

4. General Education Electives

8 General Education Electives

5. Wellness Education

2 Wellness courses

c) *Science Courses*

By its nature, the science curriculum that a student in the ISE program will take depends on his/her specific science or mathematics track, which is then integrated with the more static business curriculum. The foundational curriculum shown in Table 1a above is the template upon which each ISE student's curriculum will be built. Students admitted into the ISE program will be required to meet with the ISE advising office to prepare an approved curriculum for their specific combination of a science or math with the business courses outlined in Table 1a. They will work with the ISE advising office and their selected science discipline to prepare an individual curriculum that satisfies the University requirements as well as those for this degree (including, for example, a Writing Intensive course).

The core courses required for the science/math track that is paired with business as part of the ISE degree are listed below by track. Additional courses from each discipline will be used to complete the required credits for the BS degree. The **process** by which ISE curricula involving different science disciplines will be developed will be:

- Preparation of a proposed Table 1A by the ISE office, working in conjunction with the student's selected science or math discipline and the College of Business.
- Review of the proposed Table 1A by academic counseling.
- Final approval of the proposed Table 1A by the heads of the involved disciplines and colleges.

6. Table 1a: Undergraduate Program Schedule – BS Integrated Science and Entrepreneurship – FOUNDATION

Indicate academic calendar type: Semester Quarter Trimester Other (describe)

Term: FALL 1						Check course classification (s)					
Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)						
SCB-ACCT-110 Financial Accounting	3		3		Instructor permission						
P5 - LAS	4	4			(Science/math foundation courses are field specific)						
P7A - COS-MATH-181 Project-Based Calculus I	4	4			MPE score >75						
FYW CLA-UWRT-150: Writing Seminar	3	3			SAT verbal score >560						
Year One ACSC-010	0										
Term credit total:	14	11	3								
Term: FALL 2						Check course classification (s)					
Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)						
LAS elective	3	3									
SCB-MKTG-230 Principles of Marketing	3		3		2 nd year standing						
SCB-MGMT-215 Org. Behavior	3		3		2 nd year standing						
SCB-FINC-220 Corporate Finance	3		3		SCB-ACCT-110, CLA-ECON-101, STAT-145						
P3- LAS	3	3									
Term credit total:	15	6	9								
Term: Summer 2						Check course classification (s)					
Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)						
Summer Co-op	0			X							
Term credit total:	0										
Term: FALL 3						Check course classification (s)					
Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)						
Science/math track 3	3		3								
Science/Math track 4	3		3								
I1 - LAS	3	3									
Science/math track 5	3		3								
SCB-MGMT-470 Entrepreneurship	3		3		3 rd year standing						
Term credit total:	15	3	9, 3								
Term: FALL 4						Check course classification (s)					
Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)						
WI COS-ISE-451-ISE Capstone 1	3		3	X	Summer co-op						
Term credit total:											
Term: SPRING 1						Check course classification (s)					
Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)						
P6 - LAS	4	4			Course-specific						
P7B COS-MATH-182 Project-Based Calculus II	4	4			COS-MATH-181						
LAS elective - COS-STAT-145 Intro to Stats	3	3									
LAS Elective - CLA-ECON-101 Principles of Microeconomics	3	3									
P1 - LAS	3	3									
Wellness 1	0										
Term credit total:	17	17									
Term: SPRING 2						Check course classification (s)					
Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)						
Science/math track 1	3		3								
Science/math track 2	3		3								
SCB-MGMT-350 Appl. Entrepreneurship/Commercialization	3		3								
P4 - LAS	3	3									
LAS-Elective	3	3									
Wellness 2	0										
Term credit total:	15	6	6,3								
Term: SPRING 3						Check course classification (s)					
Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)						
P2 LAS	3	3									
Open Elective *	3										
I2 - LAS	3	3									
Science/Math track 6	3		3								
LAS Elective	3	3									
Term credit total:	15	9	3								
Term: Summer 3						Check course classification (s)					
Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)						
Summer Co-op	0			X							
Term credit total:	0										
Term: SPRING 4						Check course classification (s)					
Course Number & Title	CR	LAS	Maj	New	Prerequisite(s)						
COS-ISE-452-ISE Capstone 2	3		3	x	ISE Capstone 1						
Term credit total:											

SCB-DECS-310 Operations Management	3		3		COS-STAT-145		Business elective	3		3		
I3 - LAS	3	3					LAS-Elective	3	3			
Open Elective*	3						LAS-Elective	3	3			
Science/Math track 7	3		3				Science/Math track 8	3		3		
Term credit total:	15	3	6, 3				Term credit total:	15	6	6,3		

* NOTE: The Open Electives cannot be business courses – they must be outside the Saunders School of Business

Program MINIMUM Totals:	Credits: 121	Liberal Arts & Sciences: 61	Major: 24+24=48 Business 24, Science 24	Open Electives: 6 Capstone: 6
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Cr: credits LAS: liberal arts & sciences Maj: major requirement New: new course Prerequisite(s): list prerequisite(s) for the noted courses

NOTE ON THE “HOME DEPARTMENT” OF THE PROGRAM:

The ISE program will be housed in the Integrated Sciences Academy within the College of Science. With an expected steady state enrollment of 11-15 students in the program per year, and a distribution across the 12 College disciplines which is likely to vary each year, it is reasonable to project an average impact to each discipline of one or two additional students enrolled in the required ISE core courses for that discipline. We do not expect this to have any material impact on teaching loads for the COS disciplines.

CORE Science/Math courses by track, in addition to the courses specified in the foundational template:

Applied Mathematics

Students in this track must take the following courses to fulfill the Gen Ed and Liberal Arts and Sciences (LAS) P2 requirements:

<i>CSCI-101 (3)</i>	<i>Principles of Computing (GEN ED elective)</i>
<i>MATH-251 (3)</i>	<i>Replaces STAT-145 (3), swap with LAS-P2</i>

These courses are required (15 credits):

MATH-219 (3)	Multivariable Calculus
MATH-241 (3)	Linear Algebra
MATH-252 (3)	Probability and Statistics II
MATH-255 (3)	Actuarial Mathematics
MATH-261 (3)	Topics in the Mathematics of Finance

Additional Applied Math and related Courses – students can choose 9 credit hours from the following courses, depending on the interests of the student, for the science/math component:

Any course at 300-level or above allowed.

MATH-200 (3)	Discrete Mathematics with Introduction to Proofs
MATH-231 (3)	Differential Equations
MATH-311 (3)	Linear Optimization
MATH-321 (3)	Game Theory
MATH-341 (3)	Advanced Linear Algebra
MATH-351 (3)	Graph Theory
MATH-411 (3)	Numerical Analysis
MATH-421 (3)	Mathematical Modeling

Applied Statistics and Actuarial Science

Students in this track must take the following courses to fulfill the Gen Ed and Liberal Arts and Sciences (LAS) P2 requirements:

<i>CSCI-101 (3)</i>	<i>Principles of Computing (GEN ED elective)</i>
<i>MATH-251 (3)</i>	<i>Replaces STAT-145 (3), swap with LAS-P2</i>

These courses are required (18 credits):

MATH-219 (3)	Multivariable Calculus
MATH-241 (3)	Linear Algebra
MATH-252 (3)	Probability and Statistics II
STAT-325 (3)	Design of Experiments

MATH-261 (3)	Topics in the Mathematics of Finance
STAT-511 (3)	Statistical Software

Additional Applied Statistics and Actuarial Science and related Courses – students can choose 6 credit hours from the following courses, depending on the interests of the student.

STAT-305 (3)	Regression Analysis
STAT-315 (3)	Statistical Quality Control
STAT-325 (3)	Design of Experiments
STAT-335 (3)	Introduction to Time Series
STAT-345 (3)	Non-parametric Statistics
STAT-415 (3)	Statistical Sampling
STAT-425 (3)	Multivariate Analysis
MATH-311 (3)	Linear Optimization
MATH-401 (3)	Stochastic Processes

Biochemistry:

These courses are required (18 credits):

CHEM-130 (1)	Chemical Connections
CHEM-151 (3)	General Chemistry
CHEM-155 (2)	Chemistry Workshop
BIOL-121 (4)	Introductory Biology I
CHMO-231 (3)	Organic Chemistry I
CHMO-235 (1)	Organic Chemistry Lab I
BIOL-122 (4)	Introductory Biology II

Additional Biochemistry and related Elective Courses – students can choose 6 credit hours from the following courses, depending on the interests of the student:

CHMB-402 (3)	Biochemistry I
BIOL-201 (4)	Cellular and Molecular Biology
CHMB-405 (3)	Biochemistry Lab (WI)
CHMO-232 (3)	Organic Chemistry II
CHMO-236 (2)	Organic Chemistry Lab II
CHMA-161 (3)	Quantitative Analysis 3
CHMA-165 (1)	Analytical Methods Lab

Bioinformatics

Students in this track must take the following courses to fulfill the Liberal Arts and Sciences (LAS) P5 and P6 requirements:

BIOL-121 (4)	Introductory Biology I
BIOL-122 (4)	Introductory Biology II

Students in this track must take the following courses to fulfill the LAS P7a and 7b requirements (the additional credits from not taking a 2nd calculus course should be allocated to an LAS elective):

MATH-161 (4)	Applied Calculus
STAT-145 (3)	Intro to Statistics

These courses are required (18 credits):

BIOL-130 (3)	Introduction to Bioinformatics
BIOL-201 (4)	Cellular and Molecular Biology
BIOL-330 (3)	Bioinformatics
CSCI-141 (4)	Computer Science I

CSCI-142 (4) Computer Science II

Additional Bioinformatics and related Courses – students can choose 6 credits from the following courses, depending on the interests of the student:

CHMG-141(4)	General and Analytical Chemistry I
CHMG-145 (1)	General and Analytical Chemistry I Lab
CHMG-142 (3)	General and Analytical Chemistry II
CHMG-146 (1)	General and Analytical Chemistry II Lab
CHMO-231 (3)	Organic Chemistry I
CHMO-235 (1)	Organic Chemistry I Lab
CHMB-402 (3)	Biochemistry I
MATH-190 (3)	Discrete Math
CSCI-243 (3)	The Mechanics of Programming
CSCI-251 (3)	Concepts of Parallel and Distributed Systems
ISTE-230 (3)	Introduction to Database and Data Modeling
BIOL-321 (3)	Genetics
BIOL-450 (5)	Genetic Engineering (WI)
BIOL-230 (3)	Bioinformatics Languages
BIOL-425 (3)	Ethics in Bioinformatics (WI)
BIOL-340 (3)	Genomics
BIOL-470 (3)	Statistical Analysis for Bioinformatics
BIOL-430 (3)	Bioinformatics Algorithms
BIOL-494 (3)	Molecular Modeling and Proteomics

Biology

Students in this track must take the following courses to fulfill the Liberal Arts and Sciences (LAS) P5 and P6 requirements:

BIOL-121 (4) Introductory Biology I

BIOL-122 (4) Introductory Biology II

Students in this track must take the following courses to fulfill the LAS P7a and 7b requirements (the additional credits from not taking a 2nd calculus course should be allocated to an LAS elective):

MATH-161 (4) Applied Calculus

STAT-145 (3) Intro to Statistics

These courses are required (14 credits)

BIOL-201 (4) Cellular and Molecular Biology

BIOL-321 (3) Genetics

BIOL-204 (3) Intro to Microbiology

BIOL-240 (4) General Ecology (WI) OR BIOL-265 Evolutionary Biology (WI)

Additional Biology and related Courses – students can choose a minimum of 10 credits from the following courses, depending on the interests of the student:

BIOL-212	Vertebrate Zoology
BIOL-218	Biology of Plants
BIOL-290	Vertebrate Evolution
BIOL-307	Microbiology of Wastewater
BIOL-310	Bioenergy
BIOL-312	Human Genetics
BIOL-335	Phage Biology
BIOL-340	Genomics

BIOL-340	Synthetic Biology
BIOL-345	Molecular Ecology
BIOL-415	Virology
BIOL-425	Ethics in Bioinformatics
BIOL-428	Eukaryotic Gene Regulation
BIOL-455	Biogeography
BIOL-473	Marine Biology
BIOL-475	Conservation Biology
BIOL-494	Molecular Modeling
BIOL-601	Genetic Disease/Disorders

Biotechnology and Molecular Bioscience

Students in this track must take the following courses to fulfill the Liberal Arts and Sciences (LAS) P5 and P6 requirements:

<i>BIOL-101/103 (4)</i>	<i>General Biology I</i>
<i>BIOL-102/104 (4)</i>	<i>General Biology II</i>

Students in this track must take the following courses to fulfill the LAS P7a and 7b requirements (the additional credits from not taking a 2nd calculus course should be allocated to an LAS elective):

<i>MATH-161 (4)</i>	<i>Applied Calculus</i>
<i>STAT-145 (3)</i>	<i>Intro to Statistics</i>

These courses are required (19 credits):

BIOL-201 (4)	Cellular and Molecular Biology
BIOL-204 (4)	Intro to Microbiology
BIOL-321 (3)	Genetics
CHMG-141 (3)	General and Analytical Chemistry I
CHMG-145 (1)	General and Analytical Chemistry I Lab
CHMG-142 (3)	General and Analytical Chemistry II
CHMG-146 (1)	General and Analytical Chemistry II Lab

Additional Biotechnology and related Courses – students can choose 5 credits from the following courses, depending on the interests of the student:

BIOL-265	Evolutionary Biology (WI)
BIOL-325	Bioinformatics Analysis Macromolecules
BIOL 303	Cell Physiology
BIOL 306	Food Microbiology
BIOL 308	Biology of Cancers (WI)
BIOL 314	Tissue Culture
BIOL 322	Developmental Biology
BIOL 335	Phage Biology
BIOL 340	Genomics
BIOL 341	Synthetic Biology
BIOL 370	Environmental Microbiology
BIOL 375	Advanced Immunology
BIOL 377	Dir Res in Devel Biology
BIOL 380	Bioremediation
BIOL 401	Bio Separations: Princ & Prac
BIOL 403	Fund of Plant Biochem & Path
BIOL 416	Plant Biotechnology
BIOL 418	Plant Molecular Biology

BIOL 427	Microbial and Viral Genetics
BIOL 440	Advanced Applied Genomics
BIOL 450	Genetic Engineering (WI)
BIOL 495	Advanced Biology Research
BIOL 415	Virology
BIOL 420	Bacterial Host Interactions
CHMO-231 (3)	Organic Chemistry I
CHMO-235 (1)	Organic Chemistry I Lab
CHMO-232 (3)	Organic Chemistry II
CHMO-236 (1)	Organic Chemistry II Lab
CHMB-402 (3)	Biochemistry I

Chemistry

These courses are required (14 credits):

CHEM-130 (1)	Chemical Connections
CHEM-151 (3)	General Chemistry
CHEM-155 (2)	Chemistry Workshop
CHMO-231 (3)	Organic Chemistry I
CHMO-235 (1)	Organic Chemistry Lab I
CHMA-161 (3)	Quantitative Analysis
CHMA-165 (1)	Analytical Methods Lab

Additional Chemistry and related Elective Courses – students can choose 10 credits from the following courses, depending on the interests of the student.

CHMA-221 (3)	Instrumental Analysis
CHMP-441 (3)	Physical Chemistry I
PHYS-211 (4)	University Physics I
PHYS-212 (4)	University Physics II
CHMP-445 (3)	Experimental Physical Chemistry (WI)

Computational Mathematics

Students in this track must take the following courses to fulfill the Gen Ed and Liberal Arts and Sciences (LAS) P2 requirements:

CSCI-101 (3)	Principles of Computing (GEN ED elective 1)
MATH-251 (3)	Replaces STAT-145 (3), swap with LAS-P2

These courses are required (17 credits):

MATH-219 (3)	Multivariable Calculus
MATH-241 (3)	Linear Algebra
MATH-252 (3)	Probability and Statistics II
MATH-255 (2)	Actuarial Mathematics
MATH-261 (3)	Topics in the Mathematics of Finance
MATH-311 (3)	Linear Optimization

Additional Computational Mathematics and related Courses – students can choose up to 7 credit hours from the following courses, depending on the interests of the student:

CSCI-243 (3)	Mechanics of Programming
CSCI-262 (3)	Introduction to Computer Science Theory
SWEN-261 (3)	Software Engineering
MATH-200 (3)	Discrete Mathematics with Introduction to Proofs
MATH-231 (3)	Differential Equations
MATH-321 (3)	Game Theory

MATH-341 (3)	Advanced Linear Algebra
MATH-351 (3)	Graph Theory
MATH-411 (3)	Numerical Analysis
MATH-412 (3)	Numerical Linear Algebra

Environmental Science

Students in this track must take the following courses to fulfill the Liberal Arts and Sciences (LAS) P5 and P6 requirements:

- BIOL-121 (4) *Introductory Biology I*
- BIOL-122 (4) *Introductory Biology II*

Students in this track must take the following courses to fulfill the LAS P7a and 7b requirements (the additional credits from not taking a 2nd calculus course should be allocated to an LAS elective):

- MATH-161 (4) *Applied Calculus*
- STAT-145 (3) *Intro to Statistics*

These courses are required (10 credits):

- ENVS-101 (3) Concepts of Environmental Science
- ENVS-111 (4) Soil Science
- ENVS-201 (3) Environmental Workshop

Additional Environmental Science and related Courses – students can choose a minimum of 14 credits from the following courses, depending on the interests of the student:

- CHMG-141, 145 (4) General and Analytical Chemistry I and Lab
- CHMG-142, 146 (4) General and Analytical Chemistry II and Lab
- ENVS-250 (4) Applications of Geographic Information Systems
- ENVS-301 (4) Environmental Science Field Skills
- ENVS-450 (4) Hydrologic Applications of GIS
- ENVS-551 (3) Environmental Science Capstone I
- ENVS-552 (3) Environmental Science Capstone II
- BIOL-204 (4) Intro to Microbiology
- BIOL-240 (4) General Ecology (WI)
- BIOL-265 (4) Evolutionary Biology (WI)
- BIOL-307 (4) Microbiology of Wastewater
- BIOL-310 (4) Bioenergy
- BIOL-455 (3) Biogeography
- BIOL-473 (3) Marine Biology
- BIOL-475 (3) Conservation Biology

Imaging Science

These courses are required for the Imaging Science Hardware track – 19 credits:

- SOFA-103 (3) Introduction to Video and Imaging Systems
- IMGS-261 (4) Linear and Fourier Methods for Imaging
- IMGS-321 (3) Geometrical Optics
- IMGS-322 (3) Physical Optics
- IMGS-251 (3) Radiometry
- IMGS-451 (3) Imaging Detectors

OR

These courses are required for the Imaging Science Software track – 19 credits:

- SOFA-103 (3) Introduction to Video and Imaging Systems
- IMGS-221 (3) Vision & Psychophysics
- IMGS-261 (4) Linear and Fourier Methods for Imaging
- IMGS-351 (3) Fundamentals of Color Science
- IMGS-361 (3) Image Processing and Computer Vision I

IMGS-362 (3) Image Processing & Computer Vision II
Additional Imaging Science and related Courses – students can choose and additional 5 credits hours from the following courses, depending on the interests of the student.

IMGS-180 (4)	Introduction to Computing and Control
IMGS-211 (3)	Probability and Statistics for Imaging
IMGS-230H (3)	The New Music of the Spheres
IMGS-241 (3)	Earth System Dynamics I
IMGS-242H (3)	Sustainability of Regional Ecosystems
IMGS-251 (3)	Radiometry
IMGS-322 (3)	Physical Optics
IMGS-341 (3)	Interactions Between Light and Matter
IMGS-351 (3)	Fundamentals of Color Science
IMGS-361 (3)	Image Processing and Computer Vision I
IMGS-362 (3)	Image Processing & Computer Vision II
IMGS-371 (4)	Imaging Systems Analysis
IMGS-431 (3)	Environmental Applications of Remote Sensing
IMGS-433 (3)	Remote Sensing Systems Engineering
IMGS-441 (3)	Noise and System Modeling
IMGS-451 (3)	Imaging Detectors
IMGS-461 (3)	Multi-Wavelength Astronomical Imaging
IMGS-462 (3)	Multivariate Statistical Image Processing

Physics

Students in this track must take the following courses to fulfill the Liberal Arts and Sciences (LAS) P5 and P6 requirements:

- PHYS-211 University Physics I (LAS-P5)
- PHYS-212 University Physics II (LAS-P6)

Students in this track must take the following courses to fulfill the LAS P7a and 7b requirements:

- MATH-181 (4) Project Based Calculus I
- MATH-182 (4) Project Based Calculus II

These courses are required (15 credit hours):

- MATH-219 (3) Multivariable Calculus
- MATH-231 (3) Differential Equations
- PHYS-213 (3) Modern Physics I
- PHYS-283 (3) Vibrations and Waves
- PHYS-320 (3) Math Methods in Physics

Additional courses: Students may pick up to 9 additional credit hours with at least one course from each category:

Theory:

- PHYS-214 (3) Modern Physics II
- PHYS-330 (4) Classical Mechanics
- PHYS-411 (4) Electricity and Magnetism
- PHYS-414 (3) Quantum Mechanics
- PHYS-440 (3) Thermal and Statistical Physics
- PHYS-432 (3) Solid State Physics
- PHYS-408 (3) Laser Physics

Experimental:

- PHYS-225 (3) Intro. to Computational Physics & Programming
- PHYS-222 (3) Electronic Measurements
- PHYS-315 (3) Experiments in Modern Physics
- PHYS-365 (3) Physical Optics

Pre-Professional Studies/Integrated Sciences (32 credit hours)

Students in this track must work with their advisor to complete at least 24 of the following 32 credit hours of coursework:

CHMG-141 General & Analytical Chemistry I	(3)
CHMG-145 General & Analytical Chemistry I Lab	(1)
CHMG-142 General & Analytical Chemistry II	(3)
CHMG-146 General & Analytical Chemistry II Lab	(1)
BIOL-121 Introduction to Biology I	(4)
BIOL-122 Introduction to Biology II	(4)
PHYS-111 College Physics I	(4)
PHYS-112 College Physics II	(4)
CHMO-231 Organic Chemistry I	(3)
CHMO-235 Organic Chemistry I Lab	(1)
CHMO-232 Organic Chemistry II	(3)
CHMO-236 Organic Chemistry II Lab	(1)

Additional courses: Students must take an additional 8 credits to complete the degree. Students should work with their advisor to develop a program to complete these requirements in order to qualify for certain pre-professional programs at some universities. Anyone interested in pre-medical studies should also work with RIT's Premedical and Health Professions Advisory Program.

d) Letters of Support

See Appendix C for the following external letters of support as well as Appendix D for internal letters of support from other departments offering required courses.

INTERNAL LETTERS OF SUPPORT:

- **James Winebrake** – Dean, College of Liberal Arts
- **Anne Haake** – Dean, B. Thomas Golisano College of Computing and Information Sciences
- **John Tu** – Senior Associate Dean, Saunders College of Business
- James Hall – Executive Director, School of Individualized Studies
- **Dr. Adwoa Botang** – COS Librarian/Library Liaison, Wallace Center

EXTERNAL LETTERS OF SUPPORT:

- **Randolph Henke** – CEO, Adarzabio Corporation
- **Ralph Wise** – Director of Systems Development, BASF
- **Jeffrey Harris** – COS Advisory Board, Xerox Corporation
- **Ken Reed** – COS Advisory Board
- **Nancy Fein** – COS Advisory Board, Toyota Corporation

- **Roger Kunz**, DVM – COS Advisory Board
- **Ted Dziuba** – COS Advisory Board, Entrepreneur
- **Matthew Bashaw, PhD** – Silicon Valley entrepreneur, executive, patent atty

e) Non-traditional Schedule (e.g., off-campus, on-line, etc.)

Not applicable. All of the courses will be offered on campus in classrooms or labs.

f) Copy of the Current Catalog Description for Existing Courses

Due to the degree of customization of the program to a specific student major, we list here the business courses that are common to all students in the program, with the understanding that the science courses will be student-specific. The courses required by the ISE program from the Saunders College of Business are existing courses taught each year, and their descriptions are provided below.

SCB-ACCT-110

Financial Accounting

An introduction to the way in which corporations report their financial performance to interested stakeholders such as investors and creditors. Coverage of the accounting cycle, generally accepted accounting principles, and analytical tools help students become informed users of financial statements. **Class 3 Credit 3 (fall, spring, summer)**

SCB-DECS-310

Operations Management

A survey of operations and supply chain management that relates to both service- and goods- producing organizations. Topics include operations and supply chain strategies; ethical behavior; forecasting; product and service design, including innovation and sustainability; capacity and inventory management; lean operations; managing projects; quality assurance; global supply chains; and the impacts of technology. (STAT-145 or equivalent, junior status) **Class 3, Credit 3 (fall, spring, summer)**

SCB-MGMT-215

Organizational Behavior

As an introductory course in managing and leading organizations, this course provides an overview of human behavior in organizations at the individual, group, and organizational level with an emphasis on enhancing organizational effectiveness. Topics include: individual differences, work teams, motivation, communication, leadership, conflict resolution, organizational culture, and organizational change. (sophomore status) **Class 3, Credit 3 (fall, spring, summer)**

SCB-MGMT-350

Entrepreneurship

This course studies the process of creating new ventures with an emphasis on understanding the role of the entrepreneur in identifying opportunities, seeking capital and other resources, and managing the formation and growth of a new venture. It addresses the role of entrepreneurship in the economy and how entrepreneurial ventures are managed for growth. (Junior status) **Class 3, Credit 3 (fall, spring, summer)**

SCB-FINC-220 Financial Management

Basic course in financial management. Covers business organization, time value of money, valuation of securities, capital budgeting decision rules, risk-return relation, Capital Asset Pricing Model, financial ratios, global finance and working capital management.

SCB-MGMT-470 Applied Entrepreneurship and Commercialization

This course enables students to gain course credit for advancing a student-originated business concept, working on a multi-disciplinary product/service commercialization team, or working with an existing entrepreneurial venture. In addition to class time, student teams meet with supervising faculty and/or their assigned project coach weekly for personalized guidance. Students must apply for admission into this program and follow the guidelines provided by the RIT Entrepreneurship Program. See www.rit.edu/research/simonecenter (section on Student Incubator) for details on additional requirements to complete your registration and the online application form. (permission of instructor) **Class 3, Credit 3 (fall, spring, summer)**

SCB-MKTG-230**Principles of Marketing**

An introduction to the field of marketing, stressing its role in the organization and society. Emphasis is on determining customer needs and wants and how the marketer can satisfy those needs through the controllable marketing variables of product, price, promotion and distribution. (sophomore status) **Class 3, Credit 3 (fall, spring, summer)**

g) New Courses

Capstone course: Fall of senior year: COS-XXXX-451-Capstone Project I

Capstone course: Spring of senior year: COS-XXXX-452-Capstone Project II

(See Appendix A for New Course Outline Forms)

Faculty

Program faculty who use direct instruction will teach all of the courses within the ISE program. Courses within the Saunders College of Business that are required by the ISE program are existing courses normally offered by the SCB and will be taught by the SCB faculty. These program faculty are listed in Table 2 below.

Since the science component of the ISE degree will consist of courses customized to meet the needs and interests of each student, the specific faculty that will be providing instruction in these disciplines will vary from student to student. Examples of such faculty are listed in Table 3 below. The Table is not all inclusive, but is intended to demonstrate capacity. In order to demonstrate the type and quality of faculty within the College of Science that will be teaching courses in ISE and providing guidance to the students, we list below some representative faculty from various disciplines within the College of Science.

The program will require the part time assistance of an academic advisor and an administrative assistant. Although there is no need for additional instructional support within the ISE, analysis shows a need for a total of 0.63 FTE to cover the advising and administration in this program.

There will be no impact on the course offerings for other COS or SCB programs or the students' ability to graduate on time.

Table 2: Current Faculty, Full-Time, Saunders College of Business who may teach SCB courses required for the ISE program

Faculty Member Name and Title/Rank at Institution (include and identify Program Director)	Program Courses which may be Taught	Highest and Other Applicable Earned Degrees and Disciplines (include College/University)	Additional Qualifications: list related certifications/licenses; professional experience in field, scholarly contributions, # patents, # publications, significant grants
Richard DeMartino, Ph.D.	MGMT-470 Applied Entrepreneurship and Commercialization	University of Virginia, 1998, Ph.D. - International Political Economy (Public Affairs)	<ul style="list-style-type: none"> - Simone Endowed Chair for Innovation and Entrepreneurship - <u>Publications</u>: 15 in 11 years - <u>Grants</u>: Entrepreneurship & Strategic Growth Program, \$320K, AIS/US Department of Labor (contractor work RochesterWork) 2007 <u>AND</u> Air-3D Technology Development \$500K, AIS/ GOV-National Science Foundation (NSF) 2014
William Evans, MBA, Senior Lecturer	Acct-110 Financial Accounting	University of Rochester, 1984, MBA - No Major/Minor listed	<ul style="list-style-type: none"> - <u>Professional experience in field</u>: VP Strategy & Bus Dev Health Imaging, Eastman Kodak Company (2001 -

			2004), Rochester, New York. <u>Consulting Experience</u> 2012: Bergmann Associates, Advice and Counsel on Valuation and Negotiation Issues re: Potential Acquisition <u>Publications</u> : 3 in 3 years
Clyde Hull, Ph.D., Associate Professor	MGMT-350 Entrepreneurship	Indiana University, 2003 Ph.D. – Management/Strategy	- Zutes Fellow <u>Publications</u> : 19 in 8 years <u>Grants</u> : The Impact of HRM on Social Performance, \$22,300, BDS/SHRM 2005
Vincent Landers, Ph.D., Assistant Professor	MKTG-230 Principles of Marketing	The University of Alabama, 2013 Ph.D. – No Major/Minor listed	<u>Publications</u> : 2 in 1 year
Erhan Mergen, Ph.D., Professor	DECS-310 Operations Management	Union College, 1981, Ph.D. – Administrative and Engineering Systems	Zutes Fellow <u>Publications</u> : 45 in 13 years
Joy Oguntebi (Olabisi), Ph.D., Assistant Professor	MGMT-215 Organizational Behavior	University of Michigan, 2009, Ph.D. – Industrial & Operations Engineering	<u>Publications</u> : 3 in 2 years
Michael Palanski, Ph.D., Associate Professor	MGMT-215 Organizational Behavior	SUNY Binghamton, 2007, Ph.D. – Organizational Behavior/Leadership	Zutes Fellow <u>Publications</u> : 16 in 7 years <u>Grants</u> : Leadership Development, \$10K, AIS/Jackson Foundation 2012
William Stevenson, Ph.D., Associate Professor	DECS-310 Operations Management	Syracuse University, 1971, Ph.D. – Production and Operations Management	

Kean Wu, Ph.D., Assistant Professor	ACCT-110 Financial Accounting	University of Oregon, 2010, Ph.D. - Accounting	
Hao Zhang, Ph.D., Associate Professor	FINC-220 Corporate Finance	SUNY Buffalo, 2010, Ph.D. - Finance	Zutes Fellow

Table 3: Examples of Current Faculty, College of Science (since the specific science/math courses will be dictated by the student's major selection, the list below is intended to serve as examples of faculty currently delivering some of the courses which may or may not be required for the ISE program):

Faculty Member Name and Title/Rank at Institution (include and identify Program Director)	Program Courses which may be Taught	Highest and Other Applicable Earned Degrees and Disciplines (include College/University)	Additional Qualifications: list related certifications/licenses; professional experience in field, scholarly contributions, other academic affiliations.
David Messinger, Associate Professor, Director of Center for Imaging Science	Advising, Imaging Science, Capstones	PhD, RPI, physics	Director, Center for Imaging Science, former director of DIRS lab, over \$3 million in grants
Paul Craig, Professor, Head of School of Chemistry and Materials Science	Advising, Chemistry, Capstones	PhD, Chemistry, University of Michigan	Head, School of Chemistry and Materials Science, over \$1 million in grants
Roger Dube, Research Professor, Director of Science Exploration	Entrepreneurship, Advising, Capstones	PhD, Physics, Princeton University	Director, Science Exploration program, Director, ISE program, over \$1.5 million in grants
Lawrence Buckley, Associate Professor, Head of School of Life Sciences	Biology, Advising, Capstones	PhD, Biology, Southern Illinois University	Head, School of Life Sciences, over \$5 million in grants
George Thurston, Associate Professor	Physics, Advising, Capstones	PhD, physics, MIT	Over \$1 million in grants
Gregory Babbitt, Assistant Professor	Environmental Science, Advising, Capstones	PhD, biology, University of Florida	Over \$30,000 in grants
Mark Fairchild, Professor, Visual Science, Associate Dean of Research, Head of Color Science	Advising, Color Science, Capstones	PhD, University of Rochester, Visual Science	Associate Dean of Research, over \$3 million in grants
Bernard Brooks, Professor, Mathematics	Advising, Mathematics, Capstones	PhD Mathematics, University of Guelph, MBA, RIT	21 publications, 6 grants
Michael Kotlarchyk, Professor, Head of School of Physics and Astronomy	Advising, Physics, Capstones	PhD Physics, MIT	Head, School of Physics and Astronomy, over 28 publications

The bulk of courses to be taken by students in the ISE program already exists, and will not have an adverse impact on faculty.
See **Appendix F** for the Curricula Vitae of faculty listed in Tables 2 and 3.

Financial Resources and Instructional Facilities

A. *Instructional Facilities and Equipment Needed*

1. **Space**

The addition of 15 students per year are expected to have a minimal impact on lecture and lab space. Most of these additional students will enroll in existing courses in their selected science discipline as well as courses in SCB. A direct lecture space impact will only occur in courses that are already filled to capacity. It is expected that this additional enrollment will be readily absorbed into the existing RIT lecture and classroom space.

The requirement for a capstone project is not expected to have an impact on existing lab space. To the extent that these students can be absorbed into the existing labs of their faculty mentor, there will be no direct impact. However, it is possible that lab space may be unavailable for specific faculty. In order that experiments and program equipment not be disturbed as projects are being constructed and calibration and experiments run, this program will share 500 square feet of space with the College of Science course for undeclared majors (COS-GSCI-101). This sharing arrangement will allow both programs to capitalize on their laboratory projects, using and reusing lab equipment, supplies, and tools.

The ISE program will hold two meetings with each cohort each semester. During these technical/social hours, students will share experiences in their specific project and develop a mutual support network that is expected to survive after graduation from RIT. These meetings will require a classroom once per month.

See Allocation for Space Request in **Appendix E**.

2. **Lab or studio space/equipment**

The ISE program will share a laboratory with the COS Science Exploration program. Both programs have laboratory-based components, and students will set up and run experiments required either for the program (Science Exploration) or their capstone (ISE). By sharing this space, the two programs will be able to make synergistic use of general laboratory analytical instrumentation, equipment, and tools. See **Appendix C** for the letter of support from Roger Dube, Director of Science Exploration, and indicating approval for shared space.

3. **Equipment or supplies specific to the ISE program**

Because capstone projects will generally require the use of specific supplies that might be beyond those currently stocked on campus, we anticipate a cost of approximately \$2000/yr. These can be obtained through department funds, grants, or may be obtained through industry partners/corporate donations.

4. **Computer facilities**

No specific additional computer facilities are anticipated above those currently available. Students generally have their own computers and prefer to use those for their personal educational work.

5. **Other space and equipment needs**

There are no additional space needs.

B. Program Financial Projections

The ISE cost model analysis in **Appendix G**, prepared by Leanne Hill, RIT Budget Analyst, includes the detailed projected expenditures and revenue over the first five years of the program. There are no anticipated capital expenditures. New Program costs for each year over a three-year period are shown below in Table 5. These costs include faculty/staff salary and benefits plus costs such as computers, instructional supplies, telephone, software licenses, travel/conferences, and tuition payment for RIT credits.

Table B, Aggregate Incremental Costs, is shown below. For more information on the new program cost model, see **Appendix G**.

The College of Science and the Saunders College of Business BS in Integrated Science and Entrepreneurship

Projected Expenditures For The Proposed Program

Table B – New Resources

Administrative Support 50% FTE: *This additional resource is required by the home department to handle the administration of the new BS degree program. Office space is requested for this additional resource.*

Advisor 20% FTE: *Management of curricula, enrollment and progress towards degree will require part time assistance from an academic advisor.*

Course Release – COS: *Modest funding of \$3,000 is requested to provide financial incentive for faculty to teach in the program through course release that will be available to their home department.*

1 additional FTE for Saunders College of Business: *The teaching load will be most heavily borne by SCB, since the program requires a set of foundational SCB courses for all ISE majors, independent of the science or math discipline chosen. We request support for one additional FTE for SCB to absorb this increase. Office space is requested for this additional resources.*

Program Director Stipend: *\$18,000 for the first year is requested as partial support for the ISE Program Director for course release, support of required administrative duties for the new program, recruiting, advertising, Open House initiatives, student mentoring, capstone project scheduling and evaluations, and periodic meetings with the ISE advisory council. Office space is requested for this additional resource.*

Graduate Teaching Assistantships: *support is requested for a graduate TA position to assist with laboratories, preparation of scientific and business presentations, and assisting in teaching of special topics such as negotiating.*

Retention and New Student Initiatives: *support is requested for materials costs, tutoring, and other expenses related to retention and new student initiatives.*

Table B (Adapted from the spreadsheet developed by Leanne Hill, Financial Analyst, RIT)

COS BS Science and Entrepreneurship ACADEMIC PROGRAM PROPOSAL PROJECTION						
PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT						
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	5 Year Total
YEAR	1	2	3	4	5	
PLANNED ENROLLMENT						
Continuing Students		9	18	26	27	
New Student Intake	10	12	12	12	12	
Total Enrollment	10	21	30	38	39	
Student Attrition	(1)	(3)	(4)	(4)	(4)	
Student Completion	0	0	(1)	(7)	(8)	
Continuing Students	9	18	26	27	27	
PLANNED FACULTY						
Tenure/TT (FTE)	0.00	0.00	0.00	0.00	1.00	
Lecturer (FTE)	0.00	0.00	0.00	0.00	0.00	
PLANNED STAFF						
Staff	0.00	0.50	0.50	0.50	0.50	
Undergraduate Academic Advisor FTE	0.10	0.10	0.10	0.20	0.20	
CREDIT HOURS						
Program Required Credit Hours	122					
% of Curriculum from Newly Created Courses	0%					
CH Consumed	318	645	924	1,149	1,188	
FINANCIALS						
Revenue (Net of Aid)	\$ 264,760	\$ 569,153	\$ 852,270	\$ 1,102,257	\$ 1,181,244	\$ 3,969,683
Faculty Expense	\$ 64,217	\$ 132,870	\$ 195,221	\$ 248,733	\$ 263,587	\$ 904,628
Total Expense	\$ 202,829	\$ 414,317	\$ 606,410	\$ 776,269	\$ 822,075	\$ 2,821,900
Contribution Margin Surplus/(Deficit)	\$ 61,931	\$ 154,836	\$ 245,859	\$ 325,988	\$ 359,169	\$ 1,147,783
Nonrecurring Expenditures						
Equipment Capital	\$ -					
Nonrecurring Expenditures	\$ 27,000					
Total Nonrecurring Expenditures	\$ 27,000					
Space Requested	300 Sq Ft					
Library						
Annual Cost	\$ -					
Status College Spending Plan:	favorable					

COS
BS Science and Entrepreneurship
ACADEMIC PROGRAM PROPOSAL PROJECTION

PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	5 Year Total
Revenue						
Tuition	\$ 407,323	\$ 875,619	\$ 1,311,184	\$ 1,695,780	\$ 1,817,298	\$ 6,107,204
Unfunded Aid	(142,563)	(306,467)	(458,914)	(593,523)	(636,054)	(2,137,521)
Net Tuition	264,760	569,153	852,270	1,102,257	1,181,244	3,969,683
Direct Department Controlled College Expenses						
College Faculty Projection						
COLA	17,315	35,862	52,700	67,089	71,131	244,098
COS	31,613	65,446	96,144	122,513	129,708	445,424
SCB	15,288	31,562	46,377	59,131	62,748	215,106
Total College Faculty Projection	64,217	132,870	195,221	248,733	263,587	904,628
College Other Direct Costs						
COLA	978	2,026	2,978	3,791	4,019	13,791
COS	3,359	6,954	10,216	13,017	13,782	47,327
SCB	917	1,893	2,782	3,547	3,764	12,903
Total College Other Direct Costs	5,254	10,873	15,975	20,355	21,564	74,022
Direct College Controlled Costs	69,471	143,743	211,196	269,088	285,152	978,650
College Overhead (Not Department Controlled)	65,128	134,715	197,931	252,218	267,310	917,302
Total Overhead	65,128	134,715	197,931	252,218	267,310	917,302
Total College Responsibility Cost	134,599	278,458	409,127	521,306	552,462	1,895,952
Total Surplus/Deficit at College Level	\$ 130,161	\$ 290,694	\$ 443,142	\$ 580,951	\$ 628,782	\$ 2,073,731
<i>Contribution at College Level</i>	<i>49.16%</i>	<i>51.07%</i>	<i>52.00%</i>	<i>52.71%</i>	<i>53.23%</i>	<i>52.24%</i>
Academic Affairs Allocation	23,532	43,372	61,394	81,833	86,138	296,269
Total Surplus/Deficit at Academic Affairs Level	\$ 106,629	\$ 247,323	\$ 381,748	\$ 499,118	\$ 542,644	\$ 1,777,462
<i>Contribution at Academic Affairs Level</i>	<i>40.27%</i>	<i>43.45%</i>	<i>44.79%</i>	<i>45.28%</i>	<i>45.94%</i>	<i>44.78%</i>
Fully Allocated	44,698	92,487	135,889	173,131	183,475	629,679
Total Surplus/Deficit at Fully Allocated Level	\$ 61,931	\$ 154,836	\$ 245,859	\$ 325,988	\$ 359,169	\$ 1,147,783
<i>Contribution at Fully Allocated Level</i>	<i>23.39%</i>	<i>27.20%</i>	<i>28.85%</i>	<i>29.57%</i>	<i>30.41%</i>	<i>28.91%</i>

ACADEMIC PROGRAM PROPOSAL PROJECTION

For questions, please contact Leanne Hill, lkhcto@rit.edu

Please submit to Leanne Hill for review prior to submission to Academic Affairs

PROGRAM DEVELOPMENT PHASE

FULL PROGRAM DEVELOPMENT

Anticipated Start Date

2018-2019

Today's Date: 5-Apr-16

Enter name of program:	BS Science and Entrepreneurship
Select Home College	COS
Select Secondary College	SCB
Enter Home Dept	
Program Type	Bachelors 4 yr UG
ILI affiliated Program	NO
PDF File Name	COS_BS Science and Entrepreneurship_2018-2019

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
Preloaded FT CrHr Mask	30	33	30	30	0	123
Program Specific Adjustments	2	-3				-1
FT Basis for Model	32	30	30	30	0	122

Student Completion Profiles	Retention Rate / 1 st year	Completion Rate	Years to Complete	Crs/Sem
1 Full Time	87.64%	66.32%	4.00	
2 Part Time	87.64%	66.32%	11.00	6.00
Summer Classes (Part Time Students Only)	NO			3.00

	CH Totals	% of Total	CH New Courses	CH Existing Courses
CAST		0%		0
CHST		0%		0
CIAS		0%		0
COLA	37	30%		37
COS	58	48%		58
COS-CIS		0%		0
GCCIS		0%		0
GIS		0%		0
KGCDE		0%		0
SCB	27	22%		27
Total	122	GOOD	0	122
Hours taken outside of Program college-includes general education classes taken outside of the college and required program courses **	64			
Interdisciplinary % of Total	52%			

Enrollment

Incremental Intake (Headcount)	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
Full Time	9	11	11	11	11
External Transfers - Year 2	1	1	1	1	1
External Transfers - Year 3					
Part Time					
Total	10	12	12	12	12
Accum. HC	10	21	30	38	39

ACADEMIC PROGRAM PROPOSAL PROJECTION

Space, Nonrecurring and Library Costs

PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT

The purpose of this worksheet is to identify any space needs, capital costs and other non-recurring needs to launch the program. Listed items will be part of the dialogue in new program approval.

Dedicated Space Needs	Preferred Location	Square Feet	Space Type	Cost Per Sq Foot	Projected Capital Costs
Program will share lab space with COS with COS course for undeclared majors, Science Exploration (GSCI-101).	Carlson A161				\$ -
Program estimates that three (3) additional staff/faculty offices will be required for Academic Advisor, Lecturer, Program Director		300	Office	\$ 90	\$ 27,000
Nonrecurring and One Time Costs	Amount				
Equipment Needs	Amount				
Library Resources (Required in Table 5, submit letter from librarian with your proposal)	Year 1	Year 2	Year 3	Annual Cost	
				\$ -	

COS							
BS Science and Entrepreneurship							
Detailed College Spending Plan							
PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT							
COS							
YEAR 5 PLAN STATUS: FAVORABLE							
	2018-2019	2019-2020	Year	2021-2022	2022-2023	Total	
	1	2	2020-2021	4	5	3	
Faculty Salary Expense Allowance	\$ 31,613	\$ 65,446	\$ 96,144	\$ 122,513	\$ 129,708	\$ 445,424	
Base Salary Assumption (Exclude Benefits)							
Faculty Inputs							
Tenure/TT (Enter FTE)							
Lecturer (Enter FTE)							
Adjunct (Enter Sections)							
Other: Faculty Release Time, Program Director	\$ 21,000	\$ 21,525	\$ 22,063	\$ 22,615	\$ 23,181		
College Planned Faculty Salary Expense							
Tenure TT Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Lecturer Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Adjunct Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other Cost	\$ 21,000	\$ 21,525	\$ 22,063	\$ 22,615	\$ 23,181	\$ 110,384	\$ 110,384
College Planned Faculty Salary Expense	\$ 21,000	\$ 21,525	\$ 22,063	\$ 22,615	\$ 23,181	\$ 110,384	\$ 110,384
Variance to Allowance	\$ 10,613	\$ 43,921	\$ 74,081	\$ 99,898	\$ 106,527	\$ 335,040	\$ 335,040
Other Direct College Costs	\$ 3,359	\$ 6,954	\$ 10,216	\$ 13,017	\$ 13,782	\$ 47,327	\$ 47,327
Base Salary Assumption (Exclude Benefits)							
Staffing: Please List							
Staff Assistant	\$ 36,000	0.5	0.5	0.5	0.5		
College Planned Staffing Salary Expense							
Staff Assistant Cost	\$ -	\$ 19,869	\$ 20,365	\$ 20,874	\$ 21,396	\$ 82,505	\$ 82,505
Total Staffing	\$ -	\$ 19,869	\$ 20,365	\$ 20,874	\$ 21,396	\$ 82,505	\$ 82,505
Other Direct Costs (Please List)							
Supplies	\$ 1,670	\$ 3,591	\$ 5,490	\$ 7,243	\$ 7,723	\$ 25,717	\$ 25,717
Student Wages	\$ 3,000	\$ 3,075	\$ 3,152	\$ 3,231	\$ 3,311	\$ 15,769	\$ 15,769
Total Non-Salary	\$ 4,670	\$ 6,666	\$ 8,642	\$ 10,474	\$ 11,034	\$ 41,486	\$ 41,486
College Planned Staffing and Other Direct Costs	\$ 4,670	\$ 26,535	\$ 29,007	\$ 31,348	\$ 32,430	\$ 123,991	\$ 123,991
Variance to Allowance	\$ (1,311)	\$ (19,581)	\$ (18,792)	\$ (18,331)	\$ (18,649)	\$ (76,664)	\$ (76,664)
College Planned Expense vs. Threshold							
Total Home College Planned Expenses	\$ 25,670	\$ 48,060	\$ 51,070	\$ 53,963	\$ 55,611		
Total Secondary College Planned Expenses	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 81,208	\$ 81,208
New Program Expense Allowance Threshold*	\$ 56,473	\$ 117,238	\$ 172,564	\$ 220,253	\$ 233,627		
Variance to Model		favorable	favorable	favorable	favorable	favorable	

SCB (Secondary College)							SCB (Secondary College)
BS Science and Entrepreneurship							BS Science and Entrepreneurship
PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT							
Complete Secondary College Worksheet Below							
SCB							
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total	
	1	2	3	4	5		
Faculty Salary Expense Allowance	\$ 15,288	\$ 31,562	\$ 46,377	\$ 59,131	\$ 62,748	\$ 215,106	
Base Salary Assumption (Exclude Benefits)							
Faculty Inputs							
Tenure/TT (Enter FTE)	\$ 70,000						1
Lecturer (Enter FTE)							
Adjunct (Enter Sections)							
Other: Faculty Release Time, Program Director							
College Planned Faculty Salary Expense							
Tenure TT Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 83,208	\$ 83,208
Lecturer Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Adjunct Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
College Planned Faculty Salary Expense	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 83,208	\$ 83,208
Variance to Allowance	\$ 15,288	\$ 31,562	\$ 46,377	\$ 59,131	\$ 62,748	\$ (20,460)	\$ 131,898
Other Direct College Costs	\$ 917	\$ 1,893	\$ 2,782	\$ 3,547	\$ 3,764	\$ 12,903	\$ 12,903
Base Salary Assumption (Exclude Benefits)							
Staffing: Please List							
College Planned Staffing Salary Expense	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Staffing	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other Direct Costs (Please List)							
Total Non-Salary	\$ 917	\$ 1,893	\$ 2,782	\$ 3,547	\$ 3,764	\$ 12,903	\$ 12,903
College Planned Staffing and Other Direct Costs	\$ 917	\$ 1,893	\$ 2,782	\$ 3,547	\$ 3,764	\$ 12,903	\$ 12,903
Variance to Allowance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

ACADEMIC PROGRAM PROPOSAL PROJECTION

Table 5: New Resources

College: COS

Program Name: BS Science and Entrepreneurship

PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT

Table 5: New Resources

List the costs of the new resources that will be engaged specifically as a result of the new program (e.g., a new faculty position or additional library resources). New resources for a given year should be carried over to the following year(s), with adjustments for inflation, if they represent a continuing cost.

New Expenditures	Year 1	Year 2	Year 3	Status
Personnel	\$ 21,000	\$ 41,394	\$ 42,428	OK
Library	\$ -	\$ -	\$ -	OK
Equipment*	\$ -			OK
Laboratories*	\$ -			OK
Supplies & Expenses (Other Than Personal Service)	\$ 4,670	\$ 6,666	\$ 8,642	OK
Capital Expenditures*	\$ 27,000			OK
Other	\$ 1,743	\$ 9,684	\$ 10,174	OK
Total all	\$ 54,413	\$ 57,744	\$ 61,244	

*Capital expenditure total reflects projected spending in years one thru three.

Overall Check OK OK OK OK

Current Status Program Reconciles

Employee Benefits Calculation

College Spending Plan Salaries	2018-2019	2019-2020	2020-2021
Full Time Faculty	\$ -	\$ -	\$ -
Full Time Staff	\$ -	\$ 19,869	\$ 20,365
Adjunct	\$ -	\$ -	\$ -
Part Time Faculty	\$ 21,000	\$ 21,525	\$ 22,063
Total Salary	\$ 21,000	\$ 41,394	\$ 42,428

Benefits

Full Time Faculty Benefits	\$ -	\$ -	\$ -
Full Time Staff Benefits	\$ -	\$ 7,852	\$ 8,250
Adjunct Benefits	\$ -	\$ -	\$ -
PartTime Faculty Benefits	\$ 1,743	\$ 1,831	\$ 1,924
Total Benefits	\$ 1,743	\$ 9,684	\$ 10,174

Reconciliation of Data - Variance should be 0 with table status of OK

College Spending Plan	\$ 25,670	\$ 48,060	\$ 51,070
Space, Nonrecurring, Library	\$ 27,000	\$ -	\$ -
Calculated Benefits	\$ 1,743	\$ 9,684	\$ 10,174
Total From Detail	\$ 54,413	\$ 57,744	\$ 61,244
Variance	\$ -	\$ -	\$ -

Library Resources

A. Assessment of Existing Library Resources

COS Library Liaison/Librarian, Dr. Adwoa Boateng, stated that “The proposed RIT BS in Integrated Science and Entrepreneurship - Colleges of Science and Business will not impact current library services and can be supported by the existing collection of books, journals and databases as long as there is library funding to allow for continuation of these resources.

Please refer to a supporting letter from Dr. Adwoa Boateng in **Appendix C**.

B. Institution’s Response to Identified Needs

“The Wallace library’s collection of journals, books and databases currently supports RIT’s College of Science and Saunders College of Business degree programs.”

Admissions and Enrollment

A. Admissions Requirements for the Proposed Program

Applicants must meet the general requirements for acceptance to RIT’s College of Science as detailed in RIT’s Undergraduate Bulletin.

Entry criteria into this BS degree program in Integrated Science and Entrepreneurship will be based on the applicant’s projected ability to complete graduation within a typical program mask timeline. Incoming first-year students pursuing this degree option will need to be admitted into RIT’s College of Science. The admissions office uses a holistic approach to reach an admission decision on each applicant, including class rank (if given), rigor (AP, IB, college-level courses), standardized test scores, recommendations, essay, grades in courses appropriate for the selected discipline (science and math for most RIT programs), activities, honors/awards, competitiveness of high school, et cetera. The ISE program will honor the admissions criteria exercised by the admissions office.

Successful students in the ISE degree program ideally will enter the program with the following preparation:

Students ideally will have achieved an ACT composite score of 27 or higher, with minimum scores of 22 in Mathematics, in English and in Reading, or SAT scores of 1200 or higher. These students would be well positioned for success in the STEM aspect of the ISE degree program. Students should be qualified to enroll in courses required for the first year of study in a science discipline within the College of Science.

English: Ability to be placed in a First-Year Writing course such as FYW: Writing Seminar (UWRT-150), UWRT-100 or similar is desirable.

Mathematics: Students that place into Mathematics (MATH-181) or higher will be prepared for success in the ISE degree program. Typically, students entering this program will have completed at least three years of high school mathematics.

Science: Typically, students entering this degree program ideally will have completed four years of high school science.

Incoming students admitted into the College of Science will be accepted into the ISE program should they elect to pursue a degree in ISE.

Internal transfer students who are pursuing this degree option will need to meet the entry requirements for this program as follows:

- Successful completion of mathematics course (or equivalent) required for admission into their specific science discipline;
- Successful completion of Critical Reading & Writing (UWRT-150) or equivalent;
- Overall GPA in courses at NTID/RIT of 2.8 or higher.

B. Process for Evaluating Exceptions to Admission Requirements

The ISE department chairperson will reserve the right to evaluate borderline applicants through the normal ISE admission process.

h) Enrollment by Persons from Groups Underrepresented in the Discipline or Occupation

The ISE program will recruit and admit qualified students from underrepresented groups as well as deaf and hard-of-hearing students both nationally and internationally.

Recruitment practices and procedures will be in accordance with those established by NTID and RIT to promote diversity in the program.

Academic Support Services

The ICS department will use a variety of approaches to advise and counsel students in the ISE program including use of the NTID Counseling and Academic Advising department who will assign an advisor/counselor to work with our department to serve these students.

The program will employ Support Services typically used for baccalaureate level programs, including interpreting and note taking.

External Review of Graduate Programs

Not applicable.

Credit for Experience

Credit for prior learning derived from experience will be considered by the ISE program director in consultation with the Deans or Associate Deans of the colleges of business and science.

Program Assessment and Improvement

The essential goal of the ISE program is to enable graduates to take on roles as project managers and directors in science or engineering efforts, CEOs and CTOs in startup and other high tech companies, and as science and technology strategists in all sizes of companies. In pursuing an ISE degree, students will gain fundamental skills and knowledge related to their selected field of science or mathematics as well as fundamental business skills required in today's technological world. The curriculum is designed to foster the development of science, business and people skills that students will need to begin a successful career.

The curriculum, along with the Program Level Outcomes Assessment Plan, was designed to incorporate a broad view of each student's selected science field when integrated with business skills. The courses include fundamental science education in their chosen field of science or mathematics, business skills such as accounting and financial management, and people skills such as effective workplace communications, multidisciplinary team management, ethics and social responsibility.

The ISE program aligns with the RIT academic program profile by providing students with knowledge and understanding of the following:

- Analysis of real world problems in order to create effective solutions:
 - Students will be able to analyze real world problems in their elected science or math discipline.
- Creation and effective management of multidisciplinary teams:
 - Students will be able to direct teams of people from various backgrounds in brainstorming, approach selection and project organization.
- The use of business best practices in the planning and execution of the program.
- The use of effective professional communication and collaboration skills:
 - Students will be able to demonstrate effective verbal and written communication skills.
 - Students will be able to work effectively as a member of a team.

See Table 6 on the following page for the Outcomes Assessment Plan for the ISE program. The head of the academic unit that houses the ISE program will coordinate the assessment process. Data will be collected and discussed at annual faculty meetings. Results of outcomes assessment measures and the use of results will be reported at the college level on a yearly basis and posted to RIT's Assessment Management System website at <http://www.taskstream.com>. The ISE program will be evaluated, annually, based on student success in meeting the identified outcomes and consideration of emerging trends in liberal arts education.

Table 6: Program Level Outcomes Assessment Plan

Program Name/College: Integrated Science and Entrepreneurship (ISE) – Colleges of Science and Business

Contact for Program Assessment: Roger Dube

Mission: The Integrated Science and Entrepreneurship (ISE) Program is designed to broaden and enrich the study of science disciplines while developing a rigorous depth of knowledge in business principles. ISE offers students the opportunity to complete a technical course of study while complimenting with Business and Entrepreneurship skills.

Program Goals	Student Learning Outcomes	Academic Program Profile	Data Source/Measure Curriculum Mapping	Benchmark	Timeline	Data Analysis Key Findings	Use of Results Action Items and Dissemination
Please List program-level goals	Students will be able to: (task, capability, knowledge, skills, and dispositions) Use measurable verbs.	Alignment to the five RIT essential outcomes - check all that apply	Assessment opportunity (course/experience) method/measures, assignment/rubric)	Standard, target, or achievement level (usually a %) Statement of student Success	Identify when and how data are collected, aggregated, and analyzed	Identify who is responsible and list key findings	Identify how results are used and shared. List any recommendations or action items
Create effective business solutions	Analyze real world problems in their field(s) of science through the development of effective business approaches to reach solutions	<input checked="" type="checkbox"/> Critical Thinking <input checked="" type="checkbox"/> Ethical Reasoning <input checked="" type="checkbox"/> Integrative Literacies <input type="checkbox"/> Global Interconnectedness <input checked="" type="checkbox"/> Creative/Innovative Thinking	COB-MGMT-350 or 470 final project	80% of students will score a 75% or higher on final project	Each student will submit to the ISE office a co-op project report (350 - Fall 3 rd year; 470 - Fall 4 th year)	Collected by ISE Dept. Assessment Coordinator	Shared with the program faculty, annual college summary report and the COS Annual Report.
			Co-op project report Rubric	80% of students will score a 2 (out of 3) or higher	Data collected from COB-MGMT-350 or 470 spring or fall		
Effectively lead multidisciplinary teams	Manage diverse technical and business teams through the project life cycle	<input checked="" type="checkbox"/> Critical Thinking <input checked="" type="checkbox"/> Ethical Reasoning <input type="checkbox"/> Integrative Literacies <input type="checkbox"/> Global Interconnectedness <input checked="" type="checkbox"/> Creative/Innovative Thinking	COB-MGMT-350 Entrepreneurship course project	80% of the students will earn a 75% or higher score on project rubric	MGMT-350 is offered annually in the fall semester	Collected by ISE Dept. Assessment Coordinator	Shared with the program faculty, annual college summary report and the COS Annual Report.
			ISE Capstone Course Project Rubric	80% of students will score a 2 (out of 3) or on team management and leadership rubric	Data collected from Capstone Project Rubric Annually fall semester		

Apply best practices in planning and executing a business plan	Implement and refine programs and procedures in the continued operation of an interdisciplinary team	<input checked="" type="checkbox"/> Critical Thinking <input type="checkbox"/> Ethical Reasoning <input checked="" type="checkbox"/> Integrative Literacies <input type="checkbox"/> Global Interconnectedness <input checked="" type="checkbox"/> Creative/Innovative Thinking	COB-MGMT-470 Appl. Entrepreneurship/Commercialization Final Exam	80% of the students will score a 75% or higher on the final exam	Data collected from Course Final Exam Annually fall semester	Collected by ISE Dept. Assessment Coordinator	Shared with the program faculty, annual college summary report and the COS Annual Report.
			ISE Capstone Course Project Rubric	80% of students will score a 2 (out of 3) or higher on the procedural and operational elements section of the Capstone Project Rubric	Data collected from Capstone Project Rubric Annually fall semester		
Assess state of the art scientific technologies	Select and utilize appropriate scientific technologies to solve a business development challenge	<input checked="" type="checkbox"/> Critical Thinking <input checked="" type="checkbox"/> Ethical Reasoning <input checked="" type="checkbox"/> Integrative Literacies <input checked="" type="checkbox"/> Global Interconnectedness <input checked="" type="checkbox"/> Creative/Innovative Thinking	ISE Co-op employer evaluation report	80% of the students will select appropriate, project related science and technology solutions per the Co-op employer evaluation report	Annual data collection from co-op report evaluation spring or fall semester	Collected by ISE Dept. Assessment Coordinator in consultation with the Co-op mentor	Shared with the program faculty, annual college summary report and the COS Annual Report.
Develop business communication skills	Demonstrate effective professional communication skills through an oral team presentation	<input checked="" type="checkbox"/> Critical Thinking <input type="checkbox"/> Ethical Reasoning <input checked="" type="checkbox"/> Integrative Literacies <input type="checkbox"/> Global Interconnectedness <input checked="" type="checkbox"/> Creative/Innovative Thinking	ISE Capstone Project Rubric: Peer/Faculty	80% of the students will demonstrate effective professional communication skills per the Capstone Rubric	Annually spring or fall semester	Collected by ISE Dept. Assessment Coordinator	Shared with the program faculty, annual college summary report and the COS Annual Report.
			Co-op Evaluation	80% of students will achieve 75% or higher on co-op evaluations Item 3: General Writing Item 4: Communication	Annual data collection of coop evaluation in spring or fall semester		
Prepare students for careers in entrepreneurship (e.g., scientists starting new businesses or	Synthesize educational experience to determine level of career preparation	<input type="checkbox"/> Critical Thinking <input type="checkbox"/> Ethical Reasoning <input type="checkbox"/> Integrative Literacies <input type="checkbox"/> Global Interconnectedness	Student Satisfaction Survey	85% of graduating students will indicate an overall "satisfaction" (3 on 5 pt. Likert scale)	Collection: Annually at the end of the fall semester beginning AY 2019/2020	Collected by ISE Dept. Assessment Coordinator	Shared with the program faculty, annual college summary report and the COS Annual Report.

managers in tech based industries)		<input type="checkbox"/> Creative/Innovative Thinking		with ISE courses and the program			
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NOTE: Science program goals of ISE will be those goals of the student's selected discipline/track, modified to reflect the somewhat reduced scope of science courses.

i) Accreditation and Program Review

No external organizations other than NYSED and Middle States will evaluate/accredit the program.

New/Emerging Field and Allied Health Areas

Although Integrated Science and Entrepreneurship is not a “field” per se, several such programs are already in place in other universities. In one notable instance, their version of this degree program has existed since 1992 and currently enjoys a sustained enrollment of 328 students spanning the four years of the program.

Transfer to Other Baccalaureate Programs

The ISE program is intended as a four-year Bachelor of Science degree. Transfer into other four-year programs, either within or outside RIT, may be possible, although the number of credits accepted for transfer will have to be determined on a case-by-case basis.

Application for Distance Education

The overall program is not seeking to be delivered via distance education.

Appendix A: New Course Outlines

New Courses for the Program

The ISE degree program will require the creation of two new capstone courses. The Course Outline Forms for these courses are included below.

ROCHESTER INSTITUTE OF TECHNOLOGY

COLLEGE OF SCIENCE
SCHOOL OF INTEGRATED SCIENCES

COS-XXXX-451

Title of course: ISE Capstone Project I

1.0 Course Information

a) Catalog Listing (click [HERE](#) for credit hour assignment guidance)

Course title (100 characters)	ISE Capstone Project I
Transcript title (30 Characters)	ISE Capstone Project I
Credit hours	3
Prerequisite(s)**	4 th year standing in ISE degree program and completion of required co-ops
Co-requisite(s)	none

b) Terms(s) offered (check at least one)

<input checked="" type="checkbox"/>	Fall
<input type="checkbox"/>	Spring
<input type="checkbox"/>	Summer
<input type="checkbox"/>	Other
<input type="checkbox"/>	Offered biennially

If "Other" is checked, explain:

c) Instructional Modes (click [HERE](#) for credit hour assignment guidance)

	Contact hours	Maximum students/section
Classroom		
Lab		

Studio		
Other (specify, i.e. online, workshop seminar, etc.)	12 (student) 3 (faculty)	2 per faculty

2.0 Course Description (as it will appear in the bulletin)

In collaboration with faculty mentor(s), students will carry out the first phase of an integrated science and entrepreneurship project, including the preparation, submission, and revision of reports on the project. Students will meet weekly with their faculty mentor and are expected to carry out the bulk of the project independently. Students will present a short talk on their progress. The project must have obtained prior written approval from the Director of the ISE program.

3.0 Goal(s) of the Course

- 3.1 To gain hands on experience in the management of a multidisciplinary team working on a technology project.
- 3.2 To gain experience with preparation and presentation of results in report form and in a public forum.
- 3.3 To develop an understanding of issues and techniques used in project and people management in a technology project.

4.0 Intended course learning outcomes and associated assessment methods

Include as many course-specific outcomes as appropriate, one outcome and assessment method per row. Click [HERE](#) for guidance on developing course learning outcomes and associated assessment techniques.

Course Learning Outcome	Assessment Method
Analyze real world problems in the student's field of science through the development of effective business approaches to reach solutions.	Research notebooks and progress reports
Manage diverse technical and business teams through the project life cycle.	Research notebooks and Capstone progress reports
Implement and refine programs and procedures in the continued operation of an interdisciplinary team	Project reports and

	oral presentations
Communicate scientific and management results in a formal written and oral report, demonstrating correct usage of relevant scientific terminology and organizational schemas	Written and oral report
Search, assess and report relevant scientific findings related to the project	Research notebooks and progress reports

5.0 Topics (should be in an enumerated list or outline format)

- 5.1 Project development
 - 5.1.1 Project goal
 - 5.1.2 Project challenges
 - 5.1.3 Team composition
 - 5.1.4 Team challenges, issues, and resolution
- 5.2 Project review
 - 5.2.1 Overview of the technical project goal
 - 5.2.3 Summary of the approaches considered
 - 5.2.3 Selection criteria and results
- 5.3 Project management
- 5.4 Project technical summary and accomplishments
- 5.5 Standards for presentation to executive management
- 5.6 Standards for written products in science and business

6.0 Possible Resources (should be in an enumerated list or outline format)

- 6.1 Resources will be project dependent

7.0 Program outcomes and/or goals supported by this course (if applicable, as an enumerated list)

- 7.1 To create effective business solutions.
- 7.2 To effectively lead multidisciplinary teams.
- 7.3 To apply best practices in planning and executing a business plan.
- 7.4 To assess state of the art scientific technologies appropriate to the student's project.
- 7.5 To develop business communication skills through writing, presenting and revising presentations and reports on the operation of the project.
- 7.6 To prepare for a career in entrepreneurship as a scientist.

8.0 Administrative Information

a) Proposal and Approval

Course proposed by	Roger Dube
Effective term	
Required approval	Approval granted date
Academic Unit Curriculum Committee	11/29/2016
Department Chair/Director/Head	11/29/2016
College Curriculum Committee	11/29/2016
College Dean	

b) Special designations for undergraduate courses

The appropriate Appendix (A, B and/or C) must be completed for each designation requested. IF YOU ARE NOT SEEKING SPECIAL COURSE DESIGNATION, DELETE THE ATTACHED APPENDICES BEFORE PROCEEDING WITH REVIEW AND APPROVAL PROCESSES.

	Optional Designations	*** Approval date (by GEC, IWC or Honors)
	General Education	
	Writing Intensive	
	Honors	

c) This outline is for a...

X	New course
	Revised course
	Deactivated course

If revised course, check all that have changed

	Course title		Mode of Delivery
	Credit hour		Course Description
	Prerequisites		Special Designation
	Contact hour		
	Other (explain briefly):		

d) Additional course information (check all that apply)

	Schedule Final Exam
	Repeatable for Credit How many times:
	Allow Multiple Enrollments in a Term
X	Required course For which programs: ISE degree program
	Program elective course For which programs:

e) Other relevant scheduling information

(e.g., special classroom, studio, or lab needs, special scheduling, media requirements)

9.0 Colleges may add additional information here if necessary

(e.g., information required by accrediting bodies)

ROCHESTER INSTITUTE OF TECHNOLOGY

COLLEGE OF SCIENCE
SCHOOL OF INTEGRATED SCIENCES

COS-XXXX-452

Title of course: ISE Capstone Project II

1.0 Course Information

a) Catalog Listing (click [HERE](#) for credit hour assignment guidance)

Course title (100 characters)	ISE Capstone Project II
Transcript title (30 Characters)	ISE Capstone Project II
Credit hours	3
Prerequisite(s)**	ISE 451 - Capstone Project I
Co-requisite(s)	none

b) Terms(s) offered (check at least one)

	Fall
X	Spring
	Summer
	Other
	Offered biennially

If "Other" is checked, explain:

c) Instructional Modes (click [HERE](#) for credit hour assignment guidance)

	Contact hours	Maximum students/section
Classroom		
Lab		
Studio		
Other (specify, i.e. online, workshop seminar, etc.)	12 (student), 3 (faculty)	2 per faculty

2.0 Course Description (as it will appear in the bulletin)

In collaboration with faculty mentor(s), students will carry out the final phase of an integrated science and entrepreneurship project, will prepare an interim paper, and will present a short talk on their progress to the Integrated Science and Entrepreneurship faculty and students and others invited by the program Director. The projects are commenced during the prior Fall semester.

3.0 Goal(s) of the Course

- 3.3 To create effective business solutions through a multidisciplinary team working on a technology project.
- 3.4 To gain experience leading multidisciplinary teams.
- 3.5 To apply best practices in executing a business plan.
- 3.6 To assess the state of the art in scientific technologies and approaches.

4.0 Intended course learning outcomes and associated assessment methods

Include as many course-specific outcomes as appropriate, one outcome and assessment method per row. Click [HERE](#) for guidance on developing course learning outcomes and associated assessment techniques.

Course Learning Outcome	Assessment Method
Analyze real world problems in a specific field of science through the development of effective business approaches to reach solutions	Research notebooks and progress reports
Manage diverse technical and business teams through a project life cycle	Research notebooks and progress reports
Implement and refine programs and procedures in the operation of the multidisciplinary team	Written reports and oral presentations
Communicate scientific and management results in formal written and oral reports, demonstrating correct usage of relevant scientific terminology and organizational schemas	Written and oral reports

5.0 Topics (should be in an enumerated list or outline format)

5.1 Project development, specific to each project, but will build upon progress from ISE 451, including:

- 5.1.1 Project Goal
- 5.1.2. Project challenges
- 5.1.3 Team composition
- 5.1.4 Team challenges, issues, and resolution

5.2 Project review

- 5.2.1 Overview of the technical project goal

- 5.2.3 Summary of the approaches considered
- 5.2.3 Selection criteria and results
- 5.3 Project management
- 5.4 Project technical summary and accomplishments
- 5.5 Presentation to executive management
- 5.6 Standards for written products in science and business

6.0 Possible Resources (should be in an enumerated list or outline format)

6.1 Resources will be project dependent

7.0 Program outcomes and/or goals supported by this course (if applicable, as an enumerated list)

- 7.6 Building upon project progress in ISE 451, develop breadth and depth of the student's selected science as it applies to an entrepreneurial effort involving a team of at least two additional people.
- 7.7 To integrate an individualized science or technology with a business effort.
- 7.8 To develop appreciation of the skills needed in applying science to the business world.
- 7.9 To develop skill in identifying practical considerations important for the success of scientific, technical, and business projects.
- 7.10 To develop skill in finding and critically evaluating peer-reviewed literature.
- 7.11 To develop writing, organizational and speaking skills.
- 7.12 To develop communication skills through writing, presenting and revising presentations and reports on the operation of the project.
- 7.7 To develop the capacity for critical thinking, problem solving, and learning.

8.0 Administrative Information

a) Proposal and Approval

Course proposed by	Roger Dube
Effective term	TBD
Required approval	Approval granted date
Academic Unit Curriculum Committee	11/29/2016
Department Chair/Director/Head	11/29/2016
College Curriculum Committee	11/29/2016
College Dean	

b) Special designations for undergraduate courses

The appropriate Appendix (A, B and/or C) must be completed for each designation requested. IF YOU ARE NOT SEEKING SPECIAL COURSE DESIGNATION, DELETE THE ATTACHED APPENDICES BEFORE PROCEEDING WITH REVIEW AND APPROVAL PROCESSES.

	Optional Designations	*** Approval date (by GEC, IWC or Honors)
	General Education	
	Writing Intensive	12/13/2016
	Honors	

c) This outline is for a...

X	New course
	Revised course
	Deactivated course

If revised course, check all that have changed

	Course title		Mode of Delivery
	Credit hour		Course Description
	Prerequisites		Special Designation
	Contact hour		
	Other (explain briefly):		

d) Additional course information (check all that apply)

	Schedule Final Exam
	Repeatable for Credit How many times:
	Allow Multiple Enrollments in a Term
X	Required course For which programs: ISE degree program
	Program elective course For which programs:

e) Other relevant scheduling information

(e.g., special classroom, studio, or lab needs, special scheduling, media requirements)

9.0 Colleges may add additional information here if necessary

(e.g., information required by accrediting bodies)

APPENDIX B: WRITING INTENSIVE

Preliminary Notes:

This appendix is meant to highlight those facets of a course that are directly relevant to its Writing Intensive (WI) status. The course outline, including course goals and course learning outcomes (sections 3 and 4 of the course outline), should clearly reflect the content of this appendix.

Information provided here will also be used to identify appropriate courses for inclusion in RIT's Writing Outcomes assessment cycle.

I. Course Category: *Check one*

First Year Writing	
General Education (WI-GE)	
Program (WI-PR)	X

A course can be both WI-GE and WI-PR.

II. Nature of the Course:

Criteria that define Writing Intensive courses at RIT can be found at the Institute Writing Committee web site ([click HERE](#)).

a. Writing-Related Learning Outcomes

List the writing-related course learning outcomes.

Communicate scientific and management results in a formal written report, demonstrating correct usage of relevant scientific terminology and organizational schemas.

b. Informal and Formal Writing Assignments

1. Informal writing (commonly described as “writing to learn”) is distributed throughout the course as appropriate to its learning outcomes. Use the space below to describe briefly the informal writing assignments in the course and the distribution of those activities throughout the course.

Informal writing includes activities such as free/quick-writing, lab notebooks, response/reading journals, and online discussions. For other examples, ([click HERE](#)).
(Shift/Enter to continue)

Students will submit bi-weekly written updated drafts of sections of the final report including the scientific and business issues and their resolutions encountered in the project. These drafts will become sections of the final report.

2. Formal writing assignments (commonly described as “writing in the discipline”) engage students in the work of the discipline/s represented by the course. Use the space below to describe briefly the formal writing assignments taught in the course, and what students will learn by

completing the assignment(s).

Formal writing assignments include genres such as a research/project report, case study, and clinical observation. For more examples, ([click HERE](#)). (Shift/Enter to continue)

Students will write and revise a final report, developed in stages throughout the semester, that highlights scientific and entrepreneurial issues and their resolutions encountered in the project.

c. Revision Policy

Students must receive feedback from instructors and have an opportunity to incorporate that feedback into a revision of the written work. Use the space below to describe briefly the kinds of feedback students are provided, and what opportunities students have to improve their writing based on that feedback.

Feedback can be given in many forms, including margin comments, summative end-comments, a 1-on-1 conference, scoring guides, and rubrics. For more information, ([click HERE](#)).

Students will be given written feedback on their bi-weekly submissions and on a draft of their final report. Students will be encouraged to incorporate feedback in a revision of the final report.

d. Class Discussion

Class topics include lessons on specific writing strategies. Use the space below to describe briefly the writing strategies discussed in the course.

In-class lessons of writing strategies can include discussions of revision strategies, genre conventions, copyediting, concision, and clarity. For more information, ([click HERE](#)).

Class discussions will include a review of conventions in writing project reports of project status and issues. Class discussions will also include writing standards for oral and slide presentations. Writing as a tool for communicating ideas will be reinforced during one-on-one meetings with mentor. Students will be encouraged to use techniques that are discussed in individual coaching in their writing and presentation preparation as a complement to class writing discussions.

e. Writing Portion of Grade

At least 20% of the overall course grade must be based on writing assignments. What portion of the course grade is based on the writing students submit?

	<20%
X	20% or more

Use the space below to describe briefly how the writing is evaluated in the course.

Biweekly written updates and the final term project.

Appendix B: Representative Median Incomes

Representative incomes for the positions held by graduates of LaSalle's program (similar to this proposed program) have been obtained from the Bureau of Labor Statistics and are listed below.

Corporate Management

- Leadership Development Program, Johnson & Johnson - \$102k
- Leadership Development Program, GlaxoSmithKline - \$102k
- Merchant Program in Pharmacy, Wal-Mart Stores, Inc. - \$59k
- Operations Manager, Delta Geophysics Inc. - \$94k
- Program Director, GlaxoSmithKline \$90k
- Sr. Marketing Associate, Digitas Health - \$70k
- Store Leadership Program, Home Depot USA, Inc. \$114k
- Supervisor – Field Automation Specialists, DHL \$74k

Project Management

- Analyst, Johnson & Johnson Consumer Group of Companies \$78k
- Assistant Contractor, Lawrence Contracting \$87k
- Project Manager, ALZA Corporation of Johnson & Johnson \$120k
- Project Manager, Fieldwork International \$120k
- Project Analyst, UnitedHealth Group \$81k
- Real Estate Project Manager, Watchdog \$87k
- Research Services Analyst, Consumer Health Sciences \$81k
- System Analyst II, Robert – Kohler Company \$86k

Corporate Analysis

- Analyst, Johnson & Johnson \$81k
- Associate Analyst, Johnson & Johnson \$67k
- Associate Systems Analyst, Pactiv Corporation \$61k
- Energy/Marine Underwriter, Navigators Group \$65k
- Export Logistics Coordinator, BDP International, Inc. \$75k
- Financial Services Professional, New York Life \$80k
- Logistics Specialist, Life Cycle Engineering \$75k
- Program Analyst, U.S. General Services Administration \$81k
- Sr. Procurement Analyst, Sunoco Inc. \$81k
- Sr. Regulatory Associate, Octagon Research Solutions \$69k
- Systems Analyst, Siemens Medical Systems \$81k

Research and Development

- Cell Culture Associate, GlaxoSmithKline \$42k
- Manufacturing Associate II, Tengion \$54k
- Quality Assurance Associate, Gemin X \$36k
- Research Support Specialist, Stony Brook University \$62k
- Scientist, GlaxoSmithKline \$62k
- Scientist, National Medical Services Labs \$82k
- Upstream Associate, AppTec Laboratory Services \$79k

Production

- Brewer, Philadelphia Brewing Company \$68k

Appendix C: Internal Letters of Support

Anne Haake

James Hall, Executive Director

James Winebrake

John Q. Tu, Senior Associate Dean

Dr. Adwoa Boateng, Librarian

Dean, College of Computing and
Information Sciences

School of Individualized Studies

Dean, College of Liberal Arts

Saunders College of Business

COS Librarian, Wallace Center

January 28, 2016

Dean Sophia Maggelakis
College of Science
Rochester Institute of Technology
Rochester, NY 14623

Dear Dr. Maggelakis:

On behalf of the B. Thomas Golisano College of Computing & Information Sciences, I would like to submit my enthusiastic support and endorsement for RIT's proposed Integrated Science and Entrepreneurship (ISE) degree program. From a global business perspective, this program will fill an important and critical need and is well aligned with goals of the RIT Strategic Plan. Closely integrating and combining disciplines from the College of Science and the Saunders College of Business will prepare RIT students in a highly unique and differentiated manner for the challenges and rewards of today's evolving workplace.

The global R&D environment requires future employees to make immediate, effective, impactful and profitable contributions. Heightened awareness of this urgent directive, obtained as an undergraduate through grounding in entrepreneurial concepts and blended with a strong technical background, will result in a highly unique skill set, adding immediate value to both the scientific and business requirements of their future employers. RIT graduates who have mastered both business and science skills will succeed through the use of a technically informed market approach to product development. A sound technical foundation, blended with a command of business skills and an awareness of customer needs, will save employers valuable time and resources, resulting in shorter time-to-market and better product success. The ISE degree program will build and reinforce these critical skills.

I believe that the ISE degree program will widen student's career possibilities, and that it best can be achieved by this interdisciplinary program that breaks down the traditional disciplinary boundaries. I enthusiastically support this important new program.

Best regards,



Anne Haake
Interim Dean

March 1, 2016

Dear Colleagues,

I enthusiastically endorse the proposed Integrated Science and Entrepreneurship program at RIT and look forward to working with colleagues in the Saunders College of Business and the College of Science to ensure that it embodies best practice in integrative studies.

Polytechnics around the country have struggled to shape flexible second choice options for students. Some institutions have chosen to invest in proposal and faculty advising driven individualized major programs; others in open ended general studies options. I'm of the opinion -- and experience -- that these options are not incompatible and indeed can create a rich internal dynamism for interdisciplinary work.

The advantage of the cross-college articulated major is the clarity it achieves in resource delivery responsibility while maintaining student relationships with faculty, and familiarity with lab and project pedagogy.

To tackle the most significant pedagogical challenge (integration), SOIS will work with the Integrated Science and Entrepreneurship program to build and maintain a series of interdisciplinary courses that will model the best of integrative practice. (See Repko, 2011; Klein and Newel, 1998; Szostak, 2013). We expect to build a series of courses that serve both general education imperatives -- and introductory and capstone courses in integrative and interdisciplinary process for students in our B.S. pathways. We welcome opportunity to explore and investigate the ways in which such courses could serve the proposed new major, and we'd further enjoy the opportunity to discuss ways in which advising practice across integrative and interdisciplinary pathways could be themselves integrated. There are also exciting marketing and recruitment opportunities that could be leveraged by examining ways to align and stack inventive and flexible options.

Happy to be supportive.



Best, Jim Hall
Executive Director, SOIS

January 27, 2016

College of Liberal Arts
92 Lomb Memorial Drive
Rochester, NY 14623-5604
585-475-2444 Fax: 585-475-7120

Dean Sophia Maggelakis
College of Science
Rochester Institute of Technology
Rochester, NY 14623

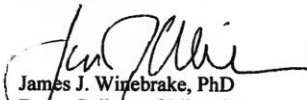
Dear Dr. Maggelakis:

Please accept my enthusiastic support and endorsement for RIT's proposed Integrated Science and Entrepreneurship (ISE) degree program. From a global business perspective, this program will fill an important and critical need. Closely integrating and combining disciplines from the College of Science and the Saunders College of Business will prepare RIT students in a highly unique and differentiated manner for the challenges and rewards of today's evolving workplace.

The global R&D environment requires future employees to make immediate, effective, impactful and profitable contributions. Heightened awareness of this urgent directive, obtained as an undergraduate through grounding in entrepreneurial concepts and blended with a strong technical background, will result in a highly unique skill set, adding immediate value to both the technical and business requirements of their future employer. RIT graduates who have mastered both business and science skills will succeed through the use of a technically informed market approach to product development. A sound technical foundation, blended with a command of business skills and an awareness of customer needs, will save their employer valuable time and resources, resulting in shorter time-to-market and better product success. The ISE degree program will build and reinforce these critical skills. I believe that the ISE degree program will widen student's career possibilities, preparing them for leadership and executive positions in R&D, product management, marketing, and technology commercialization. I enthusiastically support this important new program.

I hope that you will be open to some collaboration from the social sciences, as well, as the degree moves forward and where appropriate. There may be particular interest in collaborating with the Public Policy Department, given the level to which public policy drives research and development activities in small and large business alike. I also look forward to working to secure the appropriate budget allocations for General Education teaching needs through the budget process once the program comes online.

Sincerely,


James J. Winebrake, PhD
Dean, College of Liberal Arts

From: John Q Tu
Sent: Monday, September 26, 2016 2:53 PM
To: 'Dr. Roger Dube'; Laura Tubbs
Cc: Sophia Maggelakis; Jacqueline Mozrall
Subject: Support letter for the ISE program proposal

Roger,

The Saunders College of Business (SCB) reviewed your proposal for a new BS interdisciplinary degree program in Integrated Science and Entrepreneurship (ISE). Our undergraduate curriculum committee along with department chairs carefully reviewed the proposed program schedule that includes 9 business courses both in terms of its feasibility to satisfy prerequisites and the faculty resource needed to accommodate the additional students. The general consensus is that the Saunders College will be able to support this program given the following conditions:

- 1) All prerequisite conditions for the 9 business courses must be met;
- 2) Given the significant number of courses and student credit hours being requested from SCB, additional sections will be needed for majority of the 9 business courses (especially those required business foundation courses). These additional sections cannot be staffed by adjuncts as that will negatively impact our required AACSB full-time coverage ratio. Therefore, approximately one lecturer FTE (9 sections of 15 students per year) for SCB must be built into the proposed cost model.

I appreciate your understanding of our faculty resource constraints. Over the last several years, we have received, and staffed, several requests from across campus to support new programs and minors. They have accumulated to become a significant burden on our limited faculty capacity. The proposed interdisciplinary ISE program is exciting, and I hope that the University is able to provide the necessary resources to facilitate this cross-college collaboration.

Let me know if you have any further questions.

John

=====
John Q. Tu, Ph.D.
Senior Associate Dean
Professor of Management Information Systems Saunders College of Business
Rochester Institute of Technology Rochester, NY 14623
Phone: (585) 475-2314
=====

☐

Rochester Institute of Technology
Wallace Center Library
90 Lomb Memorial Drive
Rochester, NY 14623-5603

Dr. Adwoa Boateng
COS Librarian/Library Liaison
Rochester Institute of Technology
Wallace Center

September 9, 2015

Dr. Roger Dube
Professor, Chester F. Carlson Center for Imaging Science,
Rochester Institute of Technology Gosnell 3206
54 Lomb Memorial Drive
Rochester, NY 14623-5604

The following outlines the library impact statement for the proposed RIT BS in Integrated Science and Business - Colleges of Science and Business. The impact is based on requests for books not published yet, new journals and interlibrary loan requests from the anticipated number of faculty and new students.

The library collections of the following universities were benchmarked: the University of Wisconsin, LaSalle University, James Madison University, the University of Illinois and Rutgers University.

The journals, books and databases by the following publishers were investigated: ACS, AEA, Fintel, Mergent, NARC, APS, Elsevier, Gale, Oxford, Proquest, Wiley and Springer.

The Wallace library's collection of journals, books and databases currently supports RIT's College of Science and Saunders College of Business degree programs.

- The Wallace library subscribes to a core collection of business and science journals by: ACS, AIP, Gale, Elsevier, Springer, Wiley and others.
- The Wallace library subscribes to a core collection of databases and books by: APS, AEA, Elsevier Science Direct, Fintel, Mergent, Springer, Web of Science Science Citation, Proquest, Ebsco, SPIE, Wiley, Ebrary Ebooks, and others.
- Journal articles and books not owned by the Wallace Library are obtained on a timely basis through the library's interlibrary loan and document delivery services (IDS), ConnectNY and NExpress (New England).

- The Wallace library is a member of the Rochester Regional Library Council (RRLC), which provides RIT students and faculty access to materials at other Monroe County libraries, using free RRLC Library access cards.

Recommendations

The proposed RIT BS in Integrated Science and Business - Colleges of Science and Business will not impact current library services and can be supported by the existing collection of books, journals and databases as long as there is library funding to allow for continuation of these resources.

Sincerely,

Adwoa Boateng

Adwoa Boateng, Ed.D
COS Library Liaison/Librarian

Appendix D: External Letters of Support

Rudolph Henke, Ph.D.

Ralph D. Wise

Lawrence Ray, Ph.D.

Matthew Bashaw, Ph.D.

Chief Executive Officer, Adarza
BioSystems, Inc.

Director of Systems Development, BASF
Battery Materials

Chief Scientist, Carestream Health, Inc.

SiValley.com, Palo Alto, CA



January 27, 2016

Sophia A. Maggelakis, Ph.D.
Dean of the College of Science
Rochester Institute of Technology
84 Lomb Memorial Drive
Rochester, NY 14623-5603

Dear Dr. Maggelakis,

I am writing this letter in strong support of the new Bachelor of Science degree program in INTEGRATED SCIENCE AND ENTREPRENEURSHIP proposed by the College of Science and the Saunders School of Business. My support comes from both my perspective as a RIT College of Science alum and as the CEO of an entrepreneurial biomedical products company, as well as an employer of RIT College of Science graduates, coop students and interns.

I believe your proposed "real-world", interdisciplinary program in Integrated Science and Entrepreneurship (ISE) is an exciting new opportunity for RIT, its students and faculty and that this program will ultimately serve to benefit industry as a result of hiring RIT graduates in this field. The program, as you have planned it, is in keeping with RIT's mission of excellence and relevance in education and training. It promises to provide it's students with the most important combinations of sound basic education, outstanding and cutting edge technical and scientific training in the context of addressing emerging and yet un-met needs in industry, research and education.

My company, Adarza BioSystems, has hired numerous RIT graduates, coop students and interns. They have worked collectively in research, product development and manufacturing requiring a wide range of technical backgrounds. Historically, we had to train these employees in business and entrepreneurial disciplines to make them more productive employees for our company and to offer them greater opportunities of advancement and career success.

In our quest to build and commercialize our next generation biomedical research and diagnostics products it will be to our advantage to hire employees that have "out of the gate" training in technical, business and entrepreneurial disciplines. The proposed ISE program curriculum promises to synergize RIT's outstanding technical and science training with training in the proposed business management best practices such as planning project execution and professional communications. The ISE program promises a very attractive academic program for your students and for success in their careers.

My review of your interdisciplinary B.S. ISE program gives me confidence that your concept and plan will lead to an outstanding program with high student and faculty interest and that your program has the potential to gain industry and academic renown. Our company looks forward to seeing RIT and the College of Science implement the new B.S. ISE program and to hiring students and graduates in this program in the future.

Regards,

A handwritten signature in blue ink that reads "R. Henke".

Randolph R. Henke, Ph.D.
Chief executive Officer
Adarza BioSystems, Inc.

Missouri

501 Pearl Dr., Suite K70-1
St. Peters, MO 63376
f: +1 (636) 474-7206

New York

150 Lucius Gordon Dr., Suite 110
West Henrietta, NY 14586
f: +1 (585) 272-0054



We create chemistry

January 6th, 2016

Mr. Ralph D. Wise, Director of Systems Development
BASF Battery Materials
8001 East Pleasant Valley Road
Independence, Ohio 44131

Dr. Sophia Maggelakis
Dean, College of Science
Rochester Institute of Technology
Rochester, NY 14623

Dear Dr. Maggelakis:

I am offering through this letter, my strong enthusiastic support and endorsement for RIT's proposed Integrated Science and Entrepreneurship (ISE) degree program. From a global business perspective, this program will fill an important and critical need. Closely integrating and combining disciplines from the colleges of Science and Business will prepare RIT students in a highly unique and differentiated manner for the challenges and rewards of the 21st century workplace.

The global, multinational, industrial scientific R&D environment requires future employees to make immediate, effective, impactful, formidable and profitable contributions. Heightened awareness of this urgent directive, obtained as an undergraduate through grounding in entrepreneurial concepts and blended with a strong technical background, will result in a highly unique skill set, adding immediate value to both the technical and business dimensions of their future employer.

Fundamental changes in how technology focused firms carry out product development and commercialization are taking place in response to new, global competitive challenges. Technical project teams and their R&D counterparts that enter product development projects with little or no regard for the market or the competitive environment, at one time could lead to success. However, in the changing competitive environment, and in fulfilling a firm's need to get closer to their customers, a market first focused approach to product development, blended and led by a strong technical and customer sensitive responses, an application development focus and highly collaborative efforts with the customer's internal project team, save untold time and scarce resources, resulting in a wider degree and higher sustainable amount of product and market success. The ISE degree program will build and reinforce these much needed skills.

Further, the ISE degree program will widen the lens of student's perceptions of career possibilities within and outside of a solely technically focused career, preparing them for leadership and executive positions in R&D, product management and marketing and technology commercialization. I am very encouraged to see the recognition by the Colleges of Business and Science for the need by industry for the ISE degree and will support it in any way I am able.

Best Regards:

A handwritten signature in blue ink, appearing to read "R.D. Wise".

Ralph D. Wise



Carestream Health Inc.
150 Verona Street
Rochester, NY 14608

April 4, 2016

Dear Dr. Maggelakis,

The College of Science at Rochester Institute of Technology has proposed a new major that blends science and business skills. This proposal clearly has value as industry is typically a blend of science (engineering) and business issues. A person with competency in both domains should be a valuable asset to an organization. For this reason I am writing in support of this proposal.

Having spent a career as an industrial scientist, I have seen the large gap between competent technical and business leaders. All too often these two groups talk past each other and not clearly understanding the challenges or complexities of the issues the other needs to grapple. A graduate with this major should be able to bridge this gap and offer directions and strategies balancing both technical and business constraints

The graduate with this degree will have the training to succeed with a small company where a limited staff needs to be adept with many disparate skills. In particular the graduate should be able to handle many business planning and strategic tasks, but be able to assist in technical issues. In many start-up endeavors the founder of the company has strong technical skills and passions, but quickly realizes that a person needs to be recruited to become the CEO. The graduate with an ISE degree can fill that role and be able to appreciate, if not contribute to the company's technical development. The founder becomes the CTO and applies his skills more effectively. The CEO needs the skills to assess when it is time to go-to-market and what the state of the competition and how to position the company to gain market share.

While I support the proposal, I should also state my reservations. This is a specialized major. The graduate will be at a disadvantage competing for positions that are singularly technical or business focused. This should not be a surprise, as the intent of the degree is to create a hybrid individual. All too often hybrids manage to do all things intended, but no one thing superbly. In domains where specialists are too expensive, then those with hybrid skills win.

I have confidence that if any institution can make this concept viable it is RIT. Moreover, if the concept needs modifications, the faculty of the College of Science will make those modifications. This degree is a fit with the mode that many companies emerge in the current economy and a person immersed in this culture early in their career could thrive and make significant contributions.

Sincerely,

Lawrence A. Ray, Ph.D.
Chief Scientist
Research and Innovation



Matthew C. Bashaw, PhD
680 Loma Verde Ave
Palo Alto, CA 94306

+1.650.279.0162

matthew.bashaw@sivalley.com

April 26, 2016

Dean Sophia Maggelakis
College of Science
Rochester Institute of Technology
Rochester, NY 14623

Dear Dean Maggelakis,

I am writing to enthusiastically endorse RIT's proposed Integrated Science and Entrepreneurship (ISE) degree program.

As a technology professional, I have held engineering and management positions in startups and Fortune 500 companies alike. In my various roles, I have observed, over and over again, that individuals with a strong blend of technical and business skills become the entrepreneurs who launch new businesses and usher new technology into the marketplace.

Today's tech companies need individuals who can make immediate contributions in fast-paced environments while pursuing market opportunities whose nature is constantly changing. A strong technical background is essential, and a keen sense of business is indispensable. The ISE program will offer RIT graduates the opportunity to gain the skill and knowledge base needed to thrive in leadership roles in tech companies.

I believe the ISE program will accelerate its graduates' ascent to leadership positions in areas including product development, technical marketing, business development, technology commercialization, management consulting, and venture capital. I fully expect program alumni to launch new businesses that significantly impact the world, and, down the road, advise future generations of entrepreneurs starting up their businesses.

The ISE program will set the standard for higher education degrees that integrate technology and business, and its graduates will no doubt be among the leaders in the next generation of high-tech entrepreneurs. It will be a program that other higher education organizations strive to emulate.

With kind regards,

Appendix E: Space Request

APPENDIX E

REQUEST FOR ALLOCATION OR RENOVATION OF SPACE

Date: 1/17/2017

Additional Space Change in Usage or Assignment New Space Construction Existing Space Modification

Time frame for request: Imminent Immediate 6-12 months Intermediate 1-3 yrs Projected: 4-6+ yrs

REQUESTOR INFORMATION

Division: ACADEMIC AFFAIRS

Department:

Submitter's Name: LAURA TUBBS Title: ASSOCIATE DEAN, COS

E-mail: LETSCH@RIT.EDU Phone: 5-2445 Fax: RIT Address: GOS 08-1104

If different from submitter:
Contact Person: ROGER DUKE Title: DIRECTOR SCIENCE EXPL.

Email: RRDP@RIT.EDU Phone: 5-5836 Address: 08-3206 Fax:

Briefly describe the function of your department:

THIS REQUEST IS PART OF A NEW BS PROGRAM PROPOSAL BETWEEN COS AND SCR

Current total assignable square footage of your department: 0 sq ft.

Number of faculty: Full-time 0 Part-time 0 Adjunct 0

Number of staff: exempt 0 non exempt 0

Number of student workers: Graduate 0 Post-Doc 0 Co-op 0

Will the # of people in this department increase or decrease w/in the next 2 years? Yes No

If there will be an increase, indicate amount and source of anticipated growth.

THE ISE PROGRAM WILL INCREASE STAFF BY 2 PEOPLE

If there will be a decrease, identify the number and types of positions.

Please address the urgency and rationale for this allocation. Include benefits if approved and consequences if not approved.

IF ISE IS APPROVED, THE SPACE MUST BE IN PLACE BEFORE THE FIRST CLASS ARRIVES.

SPACE REQUEST

Sq. ft.: 90 # of rooms: 2 Number of occupants per room: 1
Hours in use/week: 40 How long is space needed? INDEFINITE

Space will be used for:

Classroom Administration Storage Support Space Conference Room
Studio (specify type) Rehearsal Space Performance Space

Laboratory

Instructional lab: Wet Dry Computer Lab

Research lab: Wet Dry Computer Lab

Other (specify)

Grant funded: Yes No

If yes, has grant been funded? Yes No

If yes, start and end dates of the grant?

If no, when do you anticipate funding?

Is the space requested part of a new faculty start-up package? Yes No
If yes, who is the faculty member? _____

Offices:

Faculty Office: Full-time Lecturer Part-time Adjunct Research

Staff Office (circle one): Exempt Non Exempt Full-time Part-Time Temporary

Explain work to be performed in this space:

Student Office: Grad Student Post Doc Student Co-op Student

Other (please specify):

Could new space be shared or serve dual purpose? Yes No
(if yes, please give an example of shared/dual usage; if no, give reason)

NO, ADVISING REQUIRES PRIVACY

Is an off-campus location to fill this request possible? Yes No
(if no, give reason)

STUDENTS NEED ACCESS TO ADVISORS

Special Requirements for Requested Space: (e.g. HVAC needs. Be specific)

When a request crosses departments, colleges or academic affairs support units, signatures from all affected areas must be secured.

1. Department Chair/Director

Laura Ellen Tubbs Associate Dean for Undergraduate
Signature on behalf of the COS. Title graduate Education Date
for new program submission COS

2. College Dean or as appropriate Associate Provost / Assistant Provost

S. Maggelakis Dean 1/17/17
Signature Title Date

Note to College Deans/Associate Provost/Assistant Provost:

List and prioritize this request with any other space request from your area currently pending with the Academic Affairs Space Committee or University Space Committee:

Return this completed form with signatures 1 & 2 to: Sue Provenzano, Eastman 2109

3. Academic Affairs Space Committee Chair

Signature Date

4. Provost and Senior Vice President for Academic Affairs

Signature Date

5. University Space Committee Chair (if needed)

Signature Date

6. President (if needed)

Signature Date

Rev. 1/10/2011

FOR CHANGE IN USAGE OR ASSIGNMENT (with no modifications of space)

Previous assignee:
Plans for accommodating previous assignee/use (if applicable):

Previous use:
Classroom _____ Faculty office _____ Administration _____ Support Space _____
Exempt Staff office _____ Non Exempt Staff Office _____ Grad Student _____ Co-op Student _____
Conference Room _____ Storage _____ Other (specify) _____
Instructional lab _____ Research lab _____ Wet _____ Dry _____

Proposed new assignee: _____ When is the space needed? _____

FOR NEW CONSTRUCTION OR EXISTING SPACE MODIFICATION

Briefly describe why this new construction or modified is needed.

Will any existing space be vacated if this request is approved? Yes _____ No _____
If yes, please list rooms that will be vacated:

Do you have funding for space construction/modification? Yes _____ No _____
If yes, what is funding source?

Have you consulted with Campus Planning and Design & Construction Services? Yes _____ No _____
If no, provide reason.

Have you consulted with Educational Technology Services (if necessary, e.g. classroom, conference room)? Yes _____ No _____

Do you have a funding source(s) for the construction or modification? Yes _____ No _____
If yes, identify the funding source(s), the amount of funding, and the time-line for receiving/expending funds.

Have funds been requested through the university budget hearing process for the renovations? Yes _____ No _____
If yes, which fiscal year and what is the status of the request? _____

Will there be incremental costs associated with the new space? (e.g. power, maintenance, security, support staff not noted above).
Yes _____ No _____

Please attach all concept work produced for this project by Campus Planning & Design or designated outside organization.

Please attach written cost estimate for your project plus any other supporting documentation, including documentation from The Wallace Center Support Services for rooms requiring audiovisual support

REVIEW AND APPROVAL SIGNATURES

Appendix F – Faculty Curricula Vitae

The following pages contain the Curricula Vitae for the following faculty:

College of Science – representative faculty

David Messinger
Paul Craig
Roger Dube
Lawrence Buckley
George Thurston
Gregory Babbitt
Mark Fairchild
Bernard Brooks
Michael Kotlarchyk

School of Business – participating faculty

Darline Augustine
Richard DeMartino
William Evans
Clyde Hull
Vincent Landers
Erhan Mergen
Joy Oguntebi
Michael Palanski
Weidong Rong
William Stevenson
Kean Wu
Hao Zhang

Appendix G: Enrollment Projection and Financial Summary

Letter from Enrollment Projection:

Roger,

February 26, 2015

As requested, here is the enrollment projection for the proposed BS in integrated science and business.

Assumptions

The program will attract new students from both freshman and transfer markets with the majority of new students entering in the fall. Given RIT's recent conversion to a semester calendar, spring semester is an even more opportune time for new students to enroll, especially transfer students.

Most of the students will come from the Middle Atlantic States – the traditional market base for the College of Science – with a smaller percentage coming from New England.

The Office of Undergraduate Admissions will work with the College of Science to determine appropriate academic profile parameters for entering students with final authority for admission decisions resting in the Office of Undergraduate Admissions.

The College of Science will work with the Office of Undergraduate Admissions to maintain and enhance RIT's relationships with two-year schools to promote the new program and develop articulation agreements to facilitate the recruitment and enrollment of transfer students into the program. Flexibility in the application of transfer credits will be critical to enrolling those students.

The program will attract internal transfers from other RIT colleges, the University Studies program, as well as other programs in the College of Science. For purposes of these projections, however, only students who are new to RIT are included in the projections.

The projections are based upon an assessment of the College Board's Student Search Service data using the following parameters to determine the level of interest in the student market: Combined PSAT scores at 115 or higher, high school grades of B+ or higher, and high school class rank in the top 40% of the graduating class. Entering transfer students would generally present a GPA of 2.8 or higher for admission.

Considering all of the above, once the program has been approved and incorporated into a full marketing cycle, we project that 10 new freshmen and 5 new transfer students would enroll in September. Inputting those projection numbers into the enrollment/cost model provided by Finance and Administration projects that accumulated new student headcount enrollment in the proposed program would be 55 after five years.

Please let me know if you have any questions.

Sincerely,

Ed Lincoln

Assistant Vice President
Enrollment Management & Career Services
Rochester Institute of Technology
60 Lomb Memorial Drive
Rochester, NY 14623
585.475.5502
585.475.5020 (fax)
ealfad@rit.edu

COS BS Science and Entrepreneurship ACADEMIC PROGRAM PROPOSAL PROJECTION						
PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT						
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	5 Year Total
YEAR	1	2	3	4	5	
PLANNED ENROLLMENT						
Continuing Students		9	18	26	27	
New Student Intake	10	12	12	12	12	
Total Enrollment	10	21	30	38	39	
Student Attrition	(1)	(3)	(4)	(4)	(4)	
Student Completion	0	0	(1)	(7)	(8)	
Continuing Students	9	18	26	27	27	
PLANNED FACULTY						
Tenure/TT (FTE)	0.00	0.00	0.00	0.00	1.00	
Lecturer (FTE)	0.00	0.00	0.00	0.00	0.00	
PLANNED STAFF						
Staff	0.00	0.50	0.50	0.50	0.50	
Undergraduate Academic Advisor FTE	0.10	0.10	0.10	0.20	0.20	
CREDIT HOURS						
Program Required Credit Hours	122					
% of Curriculum from Newly Created Courses	0%					
CH Consumed	318	645	924	1,149	1,188	
FINANCIALS						
Revenue (Net of Aid)	\$ 264,760	\$ 569,153	\$ 852,270	\$ 1,102,257	\$ 1,181,244	\$ 3,969,683
Faculty Expense	\$ 64,217	\$ 132,870	\$ 195,221	\$ 248,733	\$ 263,587	\$ 904,628
Total Expense	\$ 202,829	\$ 414,317	\$ 606,410	\$ 776,269	\$ 822,075	\$ 2,821,900
Contribution Margin Surplus/(Deficit)	\$ 61,931	\$ 154,836	\$ 245,859	\$ 325,988	\$ 359,169	\$ 1,147,783
Nonrecurring Expenditures						
Equipment Capital	\$ -					
Nonrecurring Expenditures	\$ 27,000					
Total Nonrecurring Expenditures	\$ 27,000					
Space Requested	300 Sq Ft					
Library						
Annual Cost	\$ -					
Status College Spending Plan:	favorable					

COS
BS Science and Entrepreneurship
ACADEMIC PROGRAM PROPOSAL PROJECTION

PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	5 Year Total
Revenue						
Tuition	\$ 407,323	\$ 875,619	\$ 1,311,184	\$ 1,695,780	\$ 1,817,298	\$ 6,107,204
Unfunded Aid	(142,563)	(306,467)	(458,914)	(593,523)	(636,054)	(2,137,521)
Net Tuition	264,760	569,153	852,270	1,102,257	1,181,244	3,969,683
Direct Department Controlled College Expenses						
College Faculty Projection						
COLA	17,315	35,862	52,700	67,089	71,131	244,098
COS	31,613	65,446	96,144	122,513	129,708	445,424
SCB	15,288	31,562	46,377	59,131	62,748	215,106
Total College Faculty Projection	64,217	132,870	195,221	248,733	263,587	904,628
College Other Direct Costs						
COLA	978	2,026	2,978	3,791	4,019	13,791
COS	3,359	6,954	10,216	13,017	13,782	47,327
SCB	917	1,893	2,782	3,547	3,764	12,903
Total College Other Direct Costs	5,254	10,873	15,975	20,355	21,564	74,022
Direct College Controlled Costs						
College Overhead (Not Department Controlled)	65,128	134,715	197,931	252,218	267,310	917,302
Total Overhead	65,128	134,715	197,931	252,218	267,310	917,302
Total College Responsibility Cost	134,599	278,458	409,127	521,306	552,462	1,895,952
Total Surplus/Deficit at College Level	\$ 130,161	\$ 290,694	\$ 443,142	\$ 580,951	\$ 628,782	\$ 2,073,731
<i>Contribution at College Level</i>	<i>49.16%</i>	<i>51.07%</i>	<i>52.00%</i>	<i>52.71%</i>	<i>53.23%</i>	<i>52.24%</i>
Academic Affairs Allocation						
Academic Affairs Allocation	23,532	43,372	61,394	81,833	86,138	296,269
Total Surplus/Deficit at Academic Affairs Level	\$ 106,629	\$ 247,323	\$ 381,748	\$ 499,118	\$ 542,644	\$ 1,777,462
<i>Contribution at Academic Affairs Level</i>	<i>40.27%</i>	<i>43.45%</i>	<i>44.79%</i>	<i>45.28%</i>	<i>45.94%</i>	<i>44.78%</i>
Fully Allocated						
Fully Allocated	44,698	92,487	135,889	173,131	183,475	629,679
Total Surplus/Deficit at Fully Allocated Level	\$ 61,931	\$ 154,836	\$ 245,859	\$ 325,988	\$ 359,169	\$ 1,147,783
<i>Contribution at Fully Allocated Level</i>	<i>23.39%</i>	<i>27.20%</i>	<i>28.85%</i>	<i>29.57%</i>	<i>30.41%</i>	<i>28.91%</i>

ACADEMIC PROGRAM PROPOSAL PROJECTION

For questions, please contact Leanne Hill, lkhcto@rit.edu

Please submit to Leanne Hill for review prior to submission to Academic Affairs

PROGRAM DEVELOPMENT PHASE

FULL PROGRAM DEVELOPMENT

Anticipated Start Date

2018-2019

Today's Date:

5-Apr-16

Enter name of program:

BS Science and Entrepreneurship

Select Home College

COS

Select Secondary College

SCB

Enter Home Dept

Bachelors 4 yr

UG

Program Type

NO

ILI affiliated Program

COS BS Science and Entrepreneurship, 2018-2019

PDF File Name

COS BS Science and Entrepreneurship, 2018-2019

Preloaded FT Cr/HR Mask

2018-2019

2019-2020

2020-2021

2021-2022

2022-2023

Total

30

33

30

30

0

123

Program Specific Adjustments

2

-3

-1

FT Basis for Model

32

30

30

30

0

122

Student Completion Profiles

Retention

Rate / 1 st year

Completion Rate

Years to Complete

Cr/sem

1 Full Time

87.64%

66.32%

4.00

2 Part Time

87.64%

66.32%

11.00

6.00

Summer Classes (Part Time Students Only)

NO

3.00

Enrollment

Incremental Intake (Headcount)

2018-2019

2019-2020

2020-2021

2021-2022

2022-2023

Full Time

9

11

11

11

11

External Transfers - Year 2

1

1

1

1

1

External Transfers - Year 3

Part Time

Total

10

12

12

12

12

Accum. HC

10

21

30

38

39

Allowances		CREDIT HOUR DISTRIBUTION AND ALLOWANCES				
Credit Hour Demand		318	645	924	1149	1188
Credit Hour Distribution	Credit Hour Distribution	Year				
	College	1	2	3	4	5
	CAST	0.00	0.00	0.00	0.00	0.00
	CHST	0.00	0.00	0.00	0.00	0.00
	CIAS	0.00	0.00	0.00	0.00	0.00
	COLA	97.00	196.00	281.00	349.00	361.00
	COS	152.00	307.00	440.00	547.00	565.00
	COS-CIS	0.00	0.00	0.00	0.00	0.00
	GCCIS	0.00	0.00	0.00	0.00	0.00
	GIS	0.00	0.00	0.00	0.00	0.00
	KGCOE	0.00	0.00	0.00	0.00	0.00
SCB	71.00	143.00	205.00	255.00	264.00	
Faculty Allowance	UG	Year				
	Faculty Allowance	1	2	3	4	5
	CAST	-	-	-	-	-
	CHST	-	-	-	-	-
	CIAS	-	-	-	-	-
	COLA	17,315	35,862	52,700	67,089	71,131
	COS	31,613	65,446	96,144	122,513	129,708
	COS-CIS	-	-	-	-	-
	GCCIS	-	-	-	-	-
	GIS	-	-	-	-	-
	KGCOE	-	-	-	-	-
SCB	15,288	31,562	46,377	59,131	62,748	
Total	\$ 64,217	\$ 132,870	\$ 195,221	\$ 248,733	\$ 263,587	
Non Instructional Allowance	Non Salary	Year				
	CAST	-	-	-	-	-
	CHST	-	-	-	-	-
	CIAS	-	-	-	-	-
	COLA	978	2,026	2,978	3,791	4,019
	COS	3,359	6,954	10,216	13,017	13,782
	COS-CIS	-	-	-	-	-
	GCCIS	-	-	-	-	-
	GIS	-	-	-	-	-
	KGCOE	-	-	-	-	-
	SCB	917	1,893	2,782	3,547	3,764
Total	\$ 5,254	\$ 10,873	\$ 15,975	\$ 20,355	\$ 21,564	
College Overhead	College Overhead	Year				
	CAST	-	-	-	-	-
	CHST	-	-	-	-	-
	CIAS	-	-	-	-	-
	COLA	12,568	26,030	38,252	48,696	51,630
	COS	30,825	63,815	93,748	119,459	126,475
	COS-CIS	-	-	-	-	-
	GCCIS	-	-	-	-	-
	GIS	-	-	-	-	-
	KGCOE	-	-	-	-	-
	SCB	21,735	44,870	65,932	84,063	89,205
Total	\$ 65,128	\$ 134,715	\$ 197,931	\$ 252,218	\$ 267,310	

ACADEMIC PROGRAM PROPOSAL PROJECTION

Space, Nonrecurring and Library Costs

PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT

The purpose of this worksheet is to identify any space needs, capital costs and other non-recurring needs to launch the program. Listed items will be part of the dialogue in new program approval.

Dedicated Space Needs	Preferred Location	Square Feet	Space Type	Cost Per Sq Foot	Projected Capital Costs
Program will share lab space with COS with COS course for undeclared majors, Science Exploration (GSCI-101).	Carlson A161				\$ -
Program estimates that three (3) additional staff/faculty offices will be required for Academic Advisor, Lecturer, Program Director		300	Office	\$ 90	\$ 27,000
Nonrecurring and One Time Costs		Amount			
Equipment Needs		Amount			
Library Resources (Required in Table 5, submit letter from librarian with your proposal)		Year 1	Year 2	Year 3	Annual Cost
					\$ -

COS BS Science and Entrepreneurship Detailed College Spending Plan PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT																																																																					
COS YEAR 5 PLAN STATUS: FAVORABLE																																																																					
	2018-2019 1	2019-2020 2	Year 2020-2021 3	2021-2022 4	2022-2023 5	Total																																																															
Faculty Salary Expense Allowance	\$ 31,613	\$ 65,446	\$ 96,144	\$ 122,513	\$ 129,708	\$ 445,424																																																															
<table border="1"> <thead> <tr> <th colspan="7">Base Salary Assumption (Exclude Benefits)</th> </tr> <tr> <th>Faculty Inputs</th> <th>2018-2019</th> <th>2019-2020</th> <th>2020-2021</th> <th>2021-2022</th> <th>2022-2023</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Tenure/TT (Enter FTE)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Lecturer (Enter FTE)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adjunct (Enter Sections)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Other: Faculty Release Time, Program Director</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>\$ 21,000</td> <td>\$ 21,525</td> <td>\$ 22,063</td> <td>\$ 22,615</td> <td>\$ 23,181</td> <td></td> </tr> </tbody> </table>							Base Salary Assumption (Exclude Benefits)							Faculty Inputs	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total	Tenure/TT (Enter FTE)							Lecturer (Enter FTE)							Adjunct (Enter Sections)							Other: Faculty Release Time, Program Director								\$ 21,000	\$ 21,525	\$ 22,063	\$ 22,615	\$ 23,181															
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College Planned Faculty Salary Expense	\$ 21,000	\$ 21,525	\$ 22,063	\$ 22,615	\$ 23,181	\$ 110,384																																																															
Variance to Allowance	\$ 10,613	\$ 43,921	\$ 74,081	\$ 99,898	\$ 106,527	\$ 335,040																																																															
Other Direct College Costs	\$ 3,359	\$ 6,954	\$ 10,216	\$ 13,017	\$ 13,782	\$ 47,327																																																															
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Total Staffing	\$ -	\$ 19,869	\$ 20,365	\$ 20,874	\$ 21,396	\$ 82,505																																																															
Other Direct Costs (Please List)																																																																					
Supplies	\$ 1,670	\$ 3,591	\$ 5,490	\$ 7,243	\$ 7,723	\$ 25,717																																																															
Student Wages	\$ 3,000	\$ 3,075	\$ 3,152	\$ 3,231	\$ 3,311	\$ 15,769																																																															
	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -																																																															
	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -																																																															
Total Non-Salary	\$ 4,670	\$ 6,666	\$ 8,642	\$ 10,474	\$ 11,034	\$ 41,486																																																															
College Planned Staffing and Other Direct Costs	\$ 4,670	\$ 26,435	\$ 29,007	\$ 31,348	\$ 32,430	\$ 123,991																																																															
Variance to Allowance	\$ (1,311)	\$ (19,581)	\$ (18,792)	\$ (18,331)	\$ (18,649)	\$ (76,664)																																																															
College Planned Expense vs. Threshold																																																																					
Total Home College Planned Expenses	\$ 25,670	\$ 48,060	\$ 51,070	\$ 53,963	\$ 55,611	\$ -																																																															
Total Secondary College Planned Expenses	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 83,208																																																															
New Program Expense Allowance Threshold*	\$ 56,473	\$ 117,238	\$ 172,564	\$ 220,253	\$ 233,627	\$ -																																																															
Variance to Model	favorable	favorable	favorable	favorable	favorable	favorable																																																															

SCB (Secondary College) BS Science and Entrepreneurship		SCB (Secondary College) BS Science and Entrepreneurship					
PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT							
Complete Secondary College Worksheet Below							
SCB		2018-2019 1	2019-2020 2	2020-2021 3	2021-2022 4	2022-2023 5	Total
Faculty Salary Expense Allowance		\$ 15,288	\$ 31,562	\$ 46,377	\$ 59,131	\$ 62,748	\$ 215,106
Faculty Inputs		Base Salary Assumption (Exclude Benefits)					
Tenure/TT (Enter FTE)	\$ 70,000						
Lecturer (Enter FTE)							
Adjunct (Enter Sections)							
Other: Faculty Release Time, Program Director							
College Planned Faculty Salary Expense							
Tenure TT Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 83,208	\$ 83,208
Lecturer Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Adjunct Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
College Planned Faculty Salary Expense	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 83,208	\$ 83,208
Variance to Allowance	\$ 15,288	\$ 31,562	\$ 46,377	\$ 59,131	\$ 62,748	\$ (20,460)	\$ 131,898
Other Direct College Costs		\$ 917	\$ 1,893	\$ 2,782	\$ 3,547	\$ 3,764	\$ 12,903
Staffing: Please List		Base Salary Assumption (Exclude Benefits)					
College Planned Staffing Salary Expense							
	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Staffing	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other Direct Costs (Please List)							
Total Non-Salary	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
College Planned Staffing and Other Direct Costs	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Variance to Allowance	\$ 917	\$ 1,893	\$ 2,782	\$ 3,547	\$ 3,764	\$	\$ 12,903

ACADEMIC PROGRAM PROPOSAL PROJECTION				
Table 5: New Resources				
College: COS				
Program Name: BS Science and Entrepreneurship				
PROGRAM DEVELOPMENT PHASE: FULL PROGRAM DEVELOPMENT				
Table 5: New Resources				
List the costs of the new resources that will be engaged specifically as a result of the new program (e.g., a new faculty position or additional library resources). New resources for a given year should be carried over to the following year(s), with adjustments for inflation, if they represent a continuing cost.				
New Expenditures	Year 1	Year 2	Year 3	Status
Personnel	\$ 21,000	\$ 41,394	\$ 42,428	OK
Library	\$ -	\$ -	\$ -	OK
Equipment*	\$ -			OK
Laboratories*	\$ -			OK
Supplies & Expenses (Other Than Personal Service)	\$ 4,670	\$ 6,666	\$ 8,642	OK
Capital Expenditures*	\$ 27,000			OK
Other	\$ 1,743	\$ 9,684	\$ 10,174	OK
Total all	\$ 54,413	\$ 57,744	\$ 61,244	
<i>*Capital expenditure total reflects projected spending in years one thru three.</i>				
Overall Check	OK	OK	OK	OK
Current Status	Program Reconciles			
Employee Benefits Calculation				
College Spending Plan Salaries	2018-2019	2019-2020	2020-2021	
Full Time Faculty	\$ -	\$ -	\$ -	
Full Time Staff	\$ -	\$ 19,869	\$ 20,365	
Adjunct	\$ -	\$ -	\$ -	
Part Time Faculty	\$ 21,000	\$ 21,525	\$ 22,063	
Total Salary	\$ 21,000	\$ 41,394	\$ 42,428	
Benefits				
Full Time Faculty Benefits	\$ -	\$ -	\$ -	
Full Time Staff Benefits	\$ -	\$ 7,852	\$ 8,250	
Adjunct Benefits	\$ -	\$ -	\$ -	
PartTime Faculty Benefits	\$ 1,743	\$ 1,831	\$ 1,924	
Total Benefits	\$ 1,743	\$ 9,684	\$ 10,174	
Reconciliation of Data - Variance should be 0 with table status of OK				
College Spending Plan	\$ 25,670	\$ 48,060	\$ 51,070	
Space, Nonrecurring, Library	\$ 27,000	\$ -	\$ -	
Calculated Benefits	\$ 1,743	\$ 9,684	\$ 10,174	
Total From Detail	\$ 54,413	\$ 57,744	\$ 61,244	
Variance	\$ -	\$ -	\$ -	