Math, Sciences and Engineering Transfer

Computer Science Transfer students Christopher Walker-Ray and Ian Ricci, both going on to UMass in computer science. Chris created a computer program to solve the popular Sudoku puzzles. Ian, who already owns a small network and website design company, expanded a program created by his professor, Tony Silvestri, so that it would work universally on all operating systems. The program translates IP addresses of visitors to a website into information on country of origin, platform, and domain name.

Math, Sciences, and Engineering Transfer

This school is comprised of six departments: Biological Sciences, Biotechnology, Chemistry, Engineering and Science Transfer, Mathematics, and Physics.

Biotechnology is an associate-degree-granting department which offers the option of transferring to a four-year biotechnology program or entering the exciting field of biotechnology as a technician after two years of study. A new certificate program with four different pathways allows current or potential employees of biotechnology companies to update or develop skills in the area of their choice, from facilities, to manufacturing, to quality control.

Engineering and Science Transfer is also a degree-granting department, which offers the first two years of a four-year university program in chemical, civil, electrical, computer, or mechanical engineering, and computer science. It also offers options for students who wish to major in biology, chemistry, mathematics, physics, pre-med, pre-dental, pre-vet, pre-pharmacy, and other science transfer programs.

The departments of Biological Sciences, Chemistry, and Physics offer a wide variety of courses for students in the health sciences, technologies, and engineering and science transfer. These departments have modern, up-to-date equipment and labs available for student use. Students can complete the first two years of a bachelor's degree in any of these academic disciplines. The degree will be awarded through the Engineering and Science Transfer department.

The Mathematics department offers developmental and college-level courses in a variety of instructional modes such as traditional lecture; student-centered group learning, self-paced, and asynchronous distance modes. Students can complete the first two years of a four-year mathematics degree and transfer to a senior college or university. The degree is awarded through the Engineering and Science Transfer department.

Engineering and Science Transfer

Associate Degree Program ESTR

The mission of the Engieering and Science Transfer Department is to provide students with the first two years of a four-year engineering or science-based curriculum. The quality and breadth of this education is such that the students may be able to transfer to any four-year college or university, and often complete their baccalaureate degree in two additional years. In addition to completing the first two years of a baccalaureate degree, the student receives the degree of Associate in Science in Engineering and Science Transfer with the following concentrations:

Associate in Science in:			
Engineering	ENGR.AS	Chemistry	CHEM.AS
Computer Science	CSCI.AS	Pre-Med/Pre-Den/Pre-Vet	MDVT.AS
Technical Engineering	TECH.AS	Mathematics	MATH.AS
Biology	BIOL.AS	Physics	PHYS.AS
Certificate of Completion in			
Technical Engineering	TECH.COC		

STCC's Engineering and Science Transfer department has been recognized as a Center for Excellence in Engineering Transfer, and annually transfers students to four-year colleges and universities all across the country. Students have transferred to over 60 colleges and universities including such well-known institutions as the Massachusetts Institute of Technology, Cornell, Purdue, University of Florida, Northeastern, Mt. Holyoke, and Boston University.

Locally, the Engineering and Science Transfer program participates in the Joint Admission program with the University of Massachusetts, and has articulation agreements with Western New England College, Worcester Polytechnic Institute, and Rensselaer Polytechnic Institute. RPI also annually presents the Joseph H. Smith Jr. '45 Award to one of the outstanding graduates of STCC's Engineering and Science Transfer program. This award is accompanied by substantial financial aid to attend RPI.

STCC's Engineering and Science Transfer department is a leader in integrating the computer with the curricula. The department has two computer laboratories: a 23-station PC networked lab and an 18-station assembly language lab. These labs are upgraded annually so that the students are constantly working with state-of-the-art software and hardware. Through these laboratories, students have access to the most modern software including the computer languages C++, Visual Basic and Java, Front Page, word processing, spreadsheets, CAD, and numerous mathematical analysis and simulation packages, as well as access to the Internet.

The department also has three multimedia classrooms where all computer science and most engineering and math courses are taught. Students also use modern labs in chemistry, physics, electronics, and materials science.

Entrance Requirements

In order to be admitted to one of the Engineering and Science Transfer programs, a student should have completed two years of algebra, one year of geometry, and one year of trigonometry or senior math. In addition, students intending to major in engineering, computer science, math, chemistry or physics should have

completed one year each of chemistry and physics, while biological sciences and pre-med/pre-dental/pre-vet majors should have completed one year each of chemistry and biology. Applicants should also have achieved minimum SAT1 scores of 500 in math and 350 in English.

The SAT exam is required for admission to all options of the Engineering and Science Transfer program except for the Technical Engineering Certificate of Completion. However, applicants with previous college experience (at STCC or elsewhere) will be exempt from the SAT requirement if they have completed all of the prerequisite college math and science courses with at least a B- average and English Composition 1 with at least a C-.

Applicants not meeting all of the entrance requirements may still be considered but should understand that it might require additional time and effort on their part in order to prepare themselves for the required mathematics, science, and engineering courses in the Engineering and Science Transfer programs. Applicants not deemed ready to enter the program are offered an alternate acceptance to the General Studies program Pre-Engineering and Science option (ENGC-GS). Students typically spend one year in this core remedying their academic deficiencies in mathematics and the sciences, and then reapply to the Engineering and Science Transfer department.

In order to transfer successfully into the Engineering and Science Transfer department from the General Studies Pre-Engineering and Science option, a student must complete all of the prerequisite mathematics and science courses with a minimum average grade of B-. In addition, ENGL-100 must be completed with a minimum grade of C-.

All applications are reviewed by the Engineering and Science Transfer department, and the successful applicant is counseled and scheduled for his or her first semester's courses by a member of the department.

ENGINEERING TRANSFER OPTION **ENGR.AS**

SEMESTER 1

No.	Course Title	Class	Lab	Credits
ENGL-100	English Composition 1	3		3
CHEM-103	General Chemistry 1	4	3	4
ENGR-203	Computer Applic. in Engineering *(or)*			
CSCI-111	Intro. to the Java Program. Language	3	3	4
MATH-155	Calculus 1	6		4
	Elective: Social Science	3		3
		19	6	18

SEMESTER 2

PHYS-132	University Physics 1	3	3	4
CHEM-203	General Chemistry 2 *(or)*			
BIOL-106	General Biology 1 (Note 1)	4	3	4
MATH-255	Calculus 2	6		4
CSCI-100	Introduction to Computer Science *(or)*			
CSCI-111	Intro. to the Java Programming Language (Note 2)	3	3	4
ENGL-200	English Comp. 2: Intro. to Lit.	3		3
		19	9	19

SEMESTER 3				
PHYS-232	University Physics 2	3	3	4
	Elective: Math, Science, or Engineering	3		3
	Elective: Engineering	3		3
MATH-355	Calculus 3	6		4
	Elective: Social Science or Humanities	3		3
		18	3	17
SEMESTER 4				
	Elective: Engineering	3		3
	Elective: Engineering	3		3
	Elective: Math, Science, or Engineering	3		3
MATH-439	Linear Algebra *(or)*			
MATH-455	Differential Equations *(or)*			
ENGR-411	Probability & Statistics for Engineers	4		4
	Elective: Social Science or Humanities	3		3
		16		16

Note 1: BIOL-106, General Biology 1, should be selected by Computer, Electrical, Industrial, and Mechanical Engineering majors going to UMass.

Note 2: Computer and Electrical Engineers going to UMass should take CSCI-111 (C++) while all other engineering majors going to UMass should take CSCI-100

Upon the successful completion of requirements for this program, as listed above, the degree of **Associate in Science in Engineering and Science Transfer** will be awarded.

COMPUTER SCIENCE TRANSFER OPTION **CSCI.AS**

No.	Course Title	Class	Lab	Credits
SEMESTER 1				
ENGL-100	English Composition 1	3		3
CSCI-100	Introduction to Computer Science	3	3	4
CSCI-111	Intro. to the Java Programming Lang.	3	3	4
MATH-155	Calculus 1	6		4
	Elective: Social Science	3		3
		18	6	18
SEMESTER 2				
ENGL-200	Composition 2: Intro. to Lit.	3		3
PHYS-132	University Physics 1	3	3	4
CSCI-211	Intermediate Topics in Java Prog.	3	3	4
MATH-255	Calculus 2	6		4
	Elective: Humanities or Soc. Science	3		3
		18	6	18

SEMESTER 3

CSCI-321	Computer Organization and Digital Logic	3	3	4
CSCI-401	Data Structures and Algorithms	3	3	4
PHYS-232	University Physics 2	3	3	4
MATH-355	Calculus 3	3		3
	Elective: Humanities or Social Science	3		3
		15	9	18

SEMESTER 4

CSCI-310	Machine and Assembly Language	3	3	4
MATH-439	Linear Algebra	3		3
MATH-376	Discrete Structures	4		4
	Elective: Math, Engr or CSCI	4		4
	Elective: Humanities or Social Science	3		3
		17	3	18

Upon the successful completion of requirements for this program, as listed above, the degree of **Associate in Science in Engineering and Science Transfer** will be awarded.

TECHNICAL ENGINEERING OPTION **TECH.AS**

The Technical Engineering Option is a general technology program. It is for students who do not want to major in any specific technology but want a broad background. If, after spending one year in this option, a student becomes interested in a specific technology, it is possible for him to transfer to that technology.

This program is also designed to interface with both the Engineering Transfer Program and the Pre-Engineering Option, Level 2 (ENGC.GS) of the General Studies Program. A student, after spending one year in either of these programs, may transfer to the Technical Engineering option with no loss of credit.

A student who completes the entire Technical Engineering option is awarded the **Associate in Science Degree in Engineering and Science Transfer.**

SEMESTER 1

No.	Course Title	Class	Lab	Credits
MECH-180	Mechanical CAD 1: 2D Fund.	2	1	2
ENGL-100	English Composition 1	3		3
CHEM-101	Survey of Chemistry 1 *(or)*			
CHEM-103	General Chemistry 1	4	3	4
MATH-132	Technical Math 1 *(or)*			
MATH-155	Calculus 1	6		4
PHYS-130	College Physics 1 *(or)*			
PHYS-132	University Physics 1	3	3	4
		18	7	17

SEMESTER 2				
MECH-280	CAD 2: 3D Fundamentals	3	3	4
WRIT-202	Technical Report Writing	3		3
MATH-232	Technical Math 2 *(or)*			
MATH-255	Calculus 2	6		4
PHYS-230	College Physics 2 *(or)*			
PHYS-232	University Physics 2	3	3	4
	Elective: Soc. Science/Humanities	3		3
		18	6	18
SEMESTER 3				
CMPA-103	Microcomputer Applic. for Windows	3		3
ESET-141	Electric Circuits *(and)*	3		3
ESET-145	Electric Circuits Lab *(or)*		3	1
ENGR-320	Circuit Analysis 1 *(and)*			
ENGR-324	Electrical Engr. Lab 1			
CIVL-345	Statics and Strength of Materials *(or)*			
ENGR-310	Mechanics 1 (Statics)	3		3
MATH-155	Calculus 1 *(or)*			
MATH-355	Calculus 3	6		4
	Elective: Math/Science/Technical	3	3	4
		18	6	18
SEMESTER 4				
CSCI-100	Intro. to Computer Science *(or)*			
CSCI-111	Intro. to Java Programming	3	3	4
ESET-260	Digital Systems *(and)*	3		3
ESET-265	Digital Systems Lab *(or)*		3	1
ENGR-420	Circuit Analysis 2 *(and)*			
ENGR-427	Electronic Engineering Lab 2			
ENGR-335	Mechanics of Materials *(or)*			
CIVL-446	Structures	4		3
MATH-255	Calculus 2 *(or)*			
MATH-455	Differential Equations	6		4
	Elective: Math/Science/Technical	3	3	3
		19	9	18

SCIENCE TRANSFER OPTION

BIOLOGICAL SCIENCES TRANSFER PROGRAMS

Springfield Technical Community College offers several biology transfer programs from which its graduates are well-qualified to enter the junior year of a biology major, pre-med major, pre-vet major, pre-dental major, or a pharmacy major. Students are advised by biology faculty members who will guide them in course selections to meet the requirements of the various colleges and universities to which the students may apply.

Students who cannot meet all the requirements for the degree of Engineering and Science Transfer may consider the option of an Associate degree in Liberal Arts

Transfer or General Studies, while pursuing the goal of transferring to a four-year college to continue studies in the biological sciences.

Biology Option **BIOL.AS**

SEMESTER 1

No.	Course Title	Class	Lab	Credits
CHEM-103	General Chemistry 1	4	3	4
BIOL-106	Biology 1	3	3	4
ENGL-100	English Composition 1	3		3
SOCL-100	Intro. to Sociology	3		3
MATH-155	Calculus 1	6		4
		19	6	18

SEMESTER 2

CHEM-203	General Chemistry 2	4	3	4
BIOL-206	Biology 2	3	3	4
ENGL-200	Comp. 2: Intro. to Lit.	3		3
PSYC-100	General Psychology	3		3
MATH-255	Calculus 2 (or)			
STAT-142	Statistics	3		3
		16	6	17

SEMESTER 3

CHEM-320	Organic Chemistry 1	3	4	4
BIOL-360	Genetics	3	4	4
	Elective: Social Science	3		3
PHYS-130	College Physics 1	3	3	4
	Elective: General Education (Note 2)	3		3
		15	11	18

SEMESTER 4

CHEM-420	Organic Chemistry 2	3	4	4
	Elective: Biology (Note 1)	3	3	4
PHYS-230	College Physics 2	3	3	4
	Elective: Humanities	3		3
	Elective: General Education (Note 2)	3		3
		15	10	18

Note 1: Electives to be selected from: BIOL-113, BIOL-121, BIOL-132, BIOL-310, BIOL-320, BIOL-350, BIOL-351

Note 2: Check curriculum of college you plan to attend to determine what this elective should be

Upon the successful completion of requirements for this program, as listed above, the degree of **Associate in Science in Engineering and Science Transfer** will be awarded.

Pre-Med/Pre-Dental/Pre-Vet Option **MDVT.AS**

SEMESTER 1

No.	Course Title	Class	Lab	Credits
CHEM-103	General Chemistry 1	4	3	4
BIOL-106	Biology 1	3	3	4
ENGL-100	English Composition 1	3		3
SOCL-100	Intro. to Sociology	3		3
MATH-132	Technical Math 1 (or)			
MATH-155	Calculus 1	6		4
		19	6	18

SEMESTER 2

CHEM-203	General Chemistry 2	4	3	4
BIOL-206	Biology 2	3	3	4
ENGL-200	Comp. 2: Intro. to Lit.	3		3
MATH-232	Technical Math 2 (or)			
MATH-255	Calculus 2	6		4
PSYC-100	General Psychology	3		3
		19	6	18

SEMESTER 3

PHYS-130	College Physics 1	3	3	4
CHEM-320	Organic Chemistry 1	3	4	4
BIOL-360	Genetics	3	4	4
	Elective: Social Science	3		3
	Elective: General Education (Note 2)	3		3
		15	11	18

SEMESTER 4

CHEM-420	Organic Chemistry 2	3	4	4
PHYS-230	College Physics 2	3	3	4
	Elective: Biology (Note 1)	3	3	4
	Elective: Humanities	3		3
	Elective: General Education (Note 2)	3		3
		15	10	18

Note 1: Electives to be selected from: BIOL-113, BIOL-121, BIOL-132, BIOL-310, BIOL-320, BIOL-350, BIOL-351.

Note 2: Check curriculum of college you plan to attend to determine what this elective should be.

Upon the successful completion of the requirements for this program, as listed above, the degree of **Associate in Science in Engineering and Science Transfer** will be awarded.

Chemistry Option **CHEM.AS**

SEMESTER 1

No.	Course Title	Class	Lab	Credits
CHEM-103	General Chemistry 1	4	3	4
ENGL-100	English Composition 1	3		3
	Elective: Humanities/Soc. Sci. (Note 1)	3		3
MATH-155	Calculus 1	6		4
ENGR-203	Computer Applications in Engin. (or)			
CSCI-100	Introduction to Computer Science	3	3	4
		19	6	18

SEMESTER 2

CHEM-203	General Chemistry 2	4	3	4
ENGL-200	Comp. 2: Intro. to Lit.	3		3
MATH-255	Calculus 2	6		4
	Elective: Humanities/Soc. Sci. (Note 1)	3		3
	Elective: Math/Science/ Technical (Note 2)	3		3
		19	3	17

SEMESTER 3

CHEM-320	Organic Chemistry 1	3	4	4
PHYS-130	College Physics 1 (or)			
PHYS-132	University Physics 1	3	3	4
MATH-355	Calculus 3	4		4
	Elective: Social Science/ Humanities (Note 1)	3		3
	Elective: Math/Science/ Technical (Note 2)	3		3
		16	7	18

SEMESTER 4

CHEM-420	Organic Chemistry 2	3	4	4
	Elective: Technical/Math/ Science (Note 2)	3		3
	Elective: Social Science/ Humanities (Note 1)	3		3
MATH-455	Differential Equations	6		4
PHYS-230	College Physics 2 (or)			
PHYS-232	University Physics 2	3	3	4
		18	7	18

Note 1: Most four-year institutions require two years of a foreign language. Check the curriculum of the college you plan to attend for specific details regarding these electives.

Note 2: Check the curriculum of the college you plan to attend to determine what this elective should be.

Upon the successful completion of requirements for this program, as listed above, the degree of **Associate in Science in Engineering and Science Transfer** will be awarded.

Mathematics Option **MATH.AS**

SEMESTER 1

No.	Course Title	Class	Lab	Credits
ENGL-100	English Composition 1	3		3
CHEM-103	General Chemistry 1	4	3	4
CSCI-111	Intro. to Java Prog. Language	3	3	4
MATH-155	Calculus 1	6		4
	Elective: Humanities/Soc. Sci. *	3		3
		19	6	18

SEMESTER 2

ENGL-200	Comp. 2: Intro. to Lit.	3		3
CHEM-203	General Chemistry 2	4	3	4
MATH-255	Calculus 2	6		4
PHYS-132	University Physics 1	3	3	4
	Elective: Humanities/Soc. Sci. *	3		3
		19	6	18

SEMESTER 3

MATH-355	Calculus 3	6		4
PHYS-232	University Physics 2	3	3	4
	Elective: General Education *	3		3
	Elective: Humanities/Social Science *	3		3
	Elective: Math/Science/Technical *	3	3	4
		18	6	18

SEMESTER 4

MATH-439	Linear Algebra	3		3
MATH-455	Differential Equations	6		4
	Elective: General Education *	3		3
	Elective: Humanities/Social Science *	3		3
MATH-376	Discrete Structures	4		4
		19		17

* Check curriculum of college you plan to attend to determine what this elective should be.

Upon the successful completion of requirements for this program, as listed above, the degree of **Associate in Science in Engineering and Science Transfer** will be awarded.

Physics Option **PHYS.AS**

SEMESTER 1

No.	Course Title	Class	Lab	Credits
ENGL-100	English Composition 1	3		3
CHEM-103	General Chemistry 1	4	3	4
CSCI-111	Intro. to Java Program. Language	3	3	4
MATH-155	Calculus 1	6		4
	Elective: Humanities/Soc. Sci. *	3		3
		19	6	18

SEMESTER 2

ENGL-200	Comp. 2: Intro. to Lit.	3		3
CHEM-203	General Chemistry 2	4	3	4
MATH-255	Calculus 2	6		4
PHYS-132	University Physics 1	3	3	4
	Elective: Humanities/Soc. Sci. *	3		3
		19	6	18

SEMESTER 3

MATH-355	Calculus 3	6		4
PHYS-232	University Physics 2	3	3	4
	Elective: General Education *	3		3
	Elective: Humanities/Social Science *	3		3
	Elective: Math/Science/Technical *	3	3	4
		18	6	18

SEMESTER 4

MATH-455	Differential Equations	6		4
PHYS-332	University Physics 3	3	3	4
	Elective: General Education *	3		3
	Elective: Humanities/Social Science *	3		3
	Elective: Math/Science/Technical *	3	3	4
		18	6	18

* Check curriculum of college you plan to attend to determine what this elective should be.

Upon the successful completion of requirements for this program, as listed above, the degree of **Associate in Science in Engineering and Science Transfer** will be awarded.

TECHNICAL ENGINEERING **TECH.COC**

Certificate of Completion program

The Technical Engineering Certificate of Completion is a fast-track program that enables a student to acquire basic engineering skills in only one year. During this year a student takes classes in chemistry, mathematics, computing, drafting, and English, and develops the ability to work in tandem with engineers and technicians taking data, performing tests, and doing routine calculations. After completion of this certificate, a student should be able to seek employment as an engineering

aide or continue his or her education toward an Associate in Science degree in the Technical Engineering Option of the Engineering and Science Transfer program.

SEMESTER 1

No.	Course Title	Class	Lab	Credits
CMPA-103	Microcomputer Applications for Windows	3		3
ENGL-100	English Composition 1	3		3
CHEM-101	Survey of Chemistry 1	3	3	4
ENGR-109	Intro. to Engineering Graphics		3	1
MATH-132	Technical Mathematics 1	4		4
		13	6	15

SEMESTER 2

WRIT-202	Technical Report Writing	3		3
PHYS-130	College Physics 1	3	3	4
ENGR-106	Intro. to Computer-Aided Drafting	1	2	1
ENGR-421	Engineering Measurements & Analysis	2	3	2
STAT-142	Statistics	3		3
		12	8	13

Upon successful completion of requirements for this program, a **Certificate of Completion in Technical Engineering** from STCC will be awarded.

Biotechnology BIOT.AS

Associate Degree Program

The Biotechnology curriculum is designed to meet the ever-expanding need for trained personnel in the field of biotechnology. The commonwealth of Massachusetts currently has the highest concentration of biotechnology activity in the world. There are now over 300 companies employing more than 28,000 people statewide. The biotechnology industry also employs over 150,000 people across the United States. This industry continues to grow in New England and is looking for trained employees. Graduates of this program will be in a challenging, exciting field with excellent benefits and opportunities.

What is biotechnology? The term biotechnology encompasses a wide range of applications associated with the use of living things such as cells and bacteria to make useful products. Current applications of biotechnology include industrial production of pharmaceuticals such as vaccines and insulin, genetic testing, DNA fingerprinting, and genetic engineering of plants and animals.

Students have the option of selecting the transfer or career option listed below. Upon successful completion of requirements for this program, as listed below, the degree of **Associate in Science in Biotechnology** will be awarded. A grade of "C" or better is required in all program courses.

Transfer Compact Option

The Biotechnology/Transfer Compact Option has been designed to meet the transfer requirements of four-year public colleges or universities that are members of the Commonwealth Transfer Compact, or those colleges that are accredited by the AACSB. All course choices should be discussed with the College's transfer counselor or your advisor, as different institutions may vary in their particular program requirements.

Career Option

The Biotechnology Career Option concentrates on the methodology and techniques of microbiology, biochemistry, cell biology, genetics, and cell culture. Career option graduates will be qualified for positions such as lab assistant, research assistant, media prep technician, quality control inspector, safety technician, manufacturing technician, and documentation specialist.

Entrance Requirements

In order to be admitted to the Biotechnology program, an applicant should have completed two years of algebra, one year of geometry, and one year of trigonometry or senior math, and one year each of chemistry, biology, and physics with a grade of "B" or better. Applicants should also have achieved a minimum of 800 combined SAT1 score.

Applicants not meeting all the entrance requirements may still be considered, but should understand that it might require additional time and effort on their part in order to prepare themselves for the required mathematics and science courses. Applicants not deemed ready to enter the program are offered an alternate acceptance to the General Studies program. Students typically spend one year in this core remedying their academic deficiencies in the mathematics and sciences, and then reapply to the Biotechnology program.

SEMESTER 1

No.	Course Title	Class	Lab	Credits
ENGL-100	English Composition 1	3		3
BIOL-106	Biology 1	3	3	4
BIOT-151	Introduction to Biotechnology	1		1
CHEM-103	General Chemistry 1	3	4	4
MATH-155	Calculus 1 *(Note 1) (or)*			
MATH-132	Tech Math 1	6		4
		16	7	16

SEMESTER 2

CMPA-103	Microcomputer Applications for Windows	3		3
BIOL-206	Biology 2	3	3	4
CHEM-203	General Chemistry 2	3	4	4
MATH-255	Calculus 2 *(Note 1) (or)*			
MATH-232	Technical Math 2	6		4
PSYC-100	General Psychology	3		3
		18	7	18

SEMESTER 3				
WRIT-202	Technical Report Writing *(or)*			
ENGL-200	English Comp. 2: Intro. to Lit.	3		3
BIOL-121	Microbiology	3	3	4
BIOL-360	Genetics	3	4	4
CHEM-320	Organic Chemistry 1 *(Note 2) (or)*			
BIOL-140	Biochemistry	3	4	4
		12	11	15
SEMESTER 4				
BIOT-251	Biotechnology	3	3	4
BIOL-351	Cell Biology	3	3	4
CHEM-420	Organic Chemistry 2 *(Note 3) (or)*			
STAT-142	Statistics	3	4	4
	Elective: Social Science	3		3
		12	10	15

Note 1: Career option students should take MATH-132 and MATH-232.
Note 2: Career option students should take BIOL-140.
Note 3: Career option students should take MATH-142.

BIOTECHNOLOGY MANUFACTURING **BMFG.COC**

Certificate of Completion program

The Biotechnology Manufacturing Certificate of Completion is a fast-track program that enables a student to acquire current biotechnology skills in one year. As the demand for employees in biotechnology increases in the greater Springfield area, particularly in biomanufacturing, there are a growing number of students who wish to complete a certificate program in biotechnology. There is also the potential for employers to want their employees to earn a certificate to update their laboratory skills. This certificate program is specifically designed for students who wish to obtain the skills and knowledge necessary for direct employment in the biotechnology industry.

There are four options within the certificate program, focusing on skills required for different jobs in biomanufacturing. The certificate consists of 27 to 29 credits with a common core of courses including biology, chemistry, and math, and several courses specific to the particular option chosen. These courses prepare the student for working in the biotechnology industry by developing the student's skills in laboratory calculations, sterile technique, proper processing of materials, and quality control procedures. After completion of this certificate, the student should be able to seek employment as a biomanufacturing technician, quality control technician, or facilities operator in a biotechnology company.

Requirements for acceptance

Students who are enrolling in the certificate program must have already met the prerequisites for enrolling in the required classes. These students may have already completed an associate or bachelor's degree, or have completed some coursework toward a degree in the biological sciences. Certain prerequisites may be waived if work experience or other circumstances warrant.

Upon successful completion of requirements for this program a **Certificate of Completion in Biotechnology Manufacturing** from STCC will be awarded.

Common core of courses for all options

SEMESTER 1

No.	Course Title	Class	Lab	Credits
CHEM-101	Survey of Chemistry 1	3	3	4
MATH-132	Technical Math 1	4		4
BIOL-102	Principles of Biology 1	3	2	4
ENGL-100	English Composition 1 *(or)*			
WRIT-202	Technical Report Writing *	3		3
		13	5	15

Students who plan to transfer on to complete a bachelor's degree in science may wish to substitute CHEM-102 or CHEM-203 for CHEM-101, and substitute BIOL-106 or BIOL-206 for BIOL-102.

* ENGL-100 is a prerequisite for WRIT-202.

Facilities Option 1

SEMESTER 2

No.	Course Title	Class	Lab	Credits
ENGY-110	Theory of Controls	3		3
ENGY-240	Principles of Refrigeration	2	3	3
(Take 6-8 credits from the following courses)				
ENGY-120	Energy Systems Lab 1	1	3	2
ENGY-220	Combustion Control Circuits	3		3
ENGY-230	Energy Systems Lab 2	1	3	2
ENGY-350	Microprocessor Controls	2	3	3
BIOL-121	Microbiology	3	3	4
				12-14

Permission may be granted to substitute a course from Facilities Option 1 for a course in Facilities Option 2.

Facilities Option 2

SEMESTER 2

No.	Course Title	Class	Lab	Credits
ELEC-110	Basic Electricity 1	2	3	3
ELEC-210	Basic Electricity 2	2	3	3
(Take two of the following courses)				
ELEC-241	Fundamentals of Motor Control	2	3	3
ELEC-331	Control System Theory	4		4
ELEC-320	Industrial Electronics 1	2	3	3
MECH-110	Materials and Processing for World-Class Manufacturing	2	3	3
				12 or 13

Manufacturing Option

SEMESTER 2

No.	Course Title	Class	Lab	Credits
BIOL-121	Microbiology	3	3	4
BIOL-140	Biochemistry	3		3
BIOL-202	Principles of Biology 2 *(or)*			
BIOL-351	Cell Biology *(or)*			
BIOT-251	Biotechnology	3	3	4
		9	6	11

CHEM-203 and BIOL-206 are prerequisites for BIOT-251 and BIOL-351. BIOT-251 and BIOL-351 may not be available in the evening.

Quality Control/Quality Assurance Option

SEMESTER 2

No.	Course Title	Class	Lab	Credits
BIOL-140	Biochemistry	3		3
STAT-142	Statistics	3		3
BIOT-210	Quality Control for Biotech. Manuf.	3		3
(Take one of the following courses)				
MATH-232	Technical Math 2	4		4
CMPA-101	Intro. to Word Processing	3		1
CMPA-103	Microcomputer Applications for Windows	3		3
CMPA-202	Advanced Word Processing	3		3
				10-13