Rose-Hulman Institute of Technology Course Catalog

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FAST TRACK CALCULUS

Please note: Fast Track Calculus will not be offered Summer 2021.

Integral and multivariable calculus, is offered during the summer (late July through late August) for selected members of our entering freshman class who have demonstrated outstanding ability in mathematics and studied a year of calculus during high school. Participants are expected to have scored at least 700 on the mathematics portion of the SAT or 31 on the mathematics portion of the ACT. Students, who have a 700 Math Score or 680 math/700 critical reading or better on the SAT, or a 30 mathematics score and at least a 31 English score on the ACT have also been admitted to the program. Participants who successfully complete Fast Track Calculus satisfy Rose-Hulman's freshman Calculus requirement, are awarded 15 quarter hours of credit toward graduation, and begin their college careers as "mathematical sophomores."

Admission to Fast Track Calculus is competitive. Interested students should contact the Head of the Mathematics Department or Director of Fast Track Calculus.

ACCELERATED MATH PHYSICS

An integrated calculus and physics course is offered during the summer (late July through late August) for selected members of our entering freshman class who have demonstrated outstanding ability in mathematics and physics having taken a year of college level calculus during high school and one year of high school physics. Participants are expected to have scored at least 700 on the mathematics portion of the SAT or 31 on the mathematics portion of the ACT. Students, who have a 700 mathematics score or 680 mathematics/700 critical reading or better on the SAT, or a 30 mathematics score and at least a 31 English score on the ACT have also been admitted to the program. Participants who successfully complete the Accelerated Math Physics Program will earn credit for MA113, PH111, and PH112. Selected students are expected to have the ability to place out of MA111 and MA112, so will start in the Fall quarter having credit for MA111, MA112, MA113, PH111, PH112 – effectively as sophomores. Admission to the Accelerated Math Physics Program is competitive. Interested students should contact the Directors of the Accelerated Math Physics Program.

NEW STUDENT ORIENTATION

To aid entering students in their adjustment to college life, a five-day orientation period for students precedes regular classroom instruction prior to the start of the academic year. Each freshman is required to be present for this program. The program offers a number of advantages to both the students and faculty. The students become

acquainted with the facilities and surroundings, with each other, and with the regulations and routines of college life. Students learn about the various student organizations, opportunities for co-curricular activities and Rose-Hulman student traditions.

Further, students are introduced to the nature of science and engineering studies, and they meet with their faculty advisers and resident assistants. Talks and discussions offer them insight into the kinds of work engineers and scientists do and into the satisfactions to be derived from a career in science and engineering.

The orientation period also permits the faculty an opportunity to administer a number of diagnostic tests. These tests seek to determine achievement levels in academic areas and are useful for two purposes: they are tools to be used by the faculty advisers and counselors to do effective counseling, and they help to identify students who may need special attention.

Although Rose-Hulman uses the best available criteria to select its students, the undeniable fact is that students come to college with widely varying degrees of motivation and with widely differing qualities of high school preparation. The diagnostic efforts of the orientation period help to identify those students who could immediately qualify for advanced work in certain areas, and those who indicate a need for additional help. Students at Rose-Hulman normally complete their degree requirements in four years, but the Institute also wishes to provide for those students who, with encouragement and opportunity, do more than the normal student in four years and for those who may need special help or a slower pace of study.

CONSULTING ENGINEERING PROGRAM

Through the generosity of J. B. Wilson, a prominent consulting engineer of Indianapolis, a program was established in 1973 to emphasize career opportunities in the field of consulting engineering and to provide selected courses which would be beneficial to students interested in consulting engineering careers.

Listed below is a program guide of recommended courses for a student interested in consulting engineering. This is not a degree program but is a supplement to the normal engineering degree programs. Some of the courses are in addition to the normal engineering degree programs and may result in a student earning more credits than are required for the B.S. degree in a specific discipline.

Students desirous of pursuing the Consulting Engineering Program should enroll in the Program by filing a declaration-of-intent form with the Chairman of the Commission. In order to be certified as having completed the Program, a student is required to successfully complete the prescribed list of courses, complete the requirements for a degree in Engineering, and take the Fundamentals of Engineering examination prior to graduation.

Upon completion of the program, students will receive a Certificate of Completion at the time of their graduation from Rose-Hulman Institute of Technology. Completion of the program will be noted on the student's official transcript but not on the diploma. The Consulting Engineer Program advisor is Dr. Kevin Sutterer P.E., Ph.D., Department of Civil and Environmental Engineering.

Download the Consulting Engineering Intention Form

Credit

EM102/EM104 Graphical Communications	2
RH330 Technical Communications	4
Or	
ENGL H230 Fundamentals of Public Speaking	4
ECON S253 Managerial Economics	4
Or	
EMGT 432/532 Technical Entrepreneurship	4
CE303 Engineering Economy	4
Or	
CHE416 Design I: Process Economics and Equipment Design	4
EMGT552 Business Law for Technical Managers	4
CE420/CHE420/ECE466 or ME420 Consulting Engineering Seminar	2
Engineering Design (any senior Engineering design course)	4
Total	24
Exceptions to these program course requirements require approval by the Consulting Engineering Program Advisor.	
Registration for & sitting for the Fundamentals of Engineering Exam required.	

STUDY ABROAD

Students are provided the opportunity to enhance their academic experience by studying at an institution abroad. The Center for Global Engagement offers information and support for students interested in immersive study abroad. To ensure the integrity of the experience, the following policies have been established.

- Students with a cumulative grade point average of 2.75 or higher, and who will have completed at least 45 earned credit hours at Rose-Hulman by the time of study abroad may apply for approval to enroll in a study abroad program.
- Students must be in good academic standing to apply for study abroad, including dual degree programs. Students who fall out of good academic standing between approval and the beginning of study abroad will be ineligible to study abroad until they are back in good standing.
- Students must remain in good standing during their study abroad program.
- Approved study abroad students will remain enrolled at the institute during the quarter or academic-year study abroad period.
- Students studying in a single location where English is not an official language are expected to study the official language of that country while studying abroad if they do not already have proficiency in that language.

- Students must maintain full-time status at the host institution and must receive a grade of “C” or better (converted to US system) in order for courses to be transferred in. Courses taken abroad for pass/fail credit will not be considered for transfer in.
- All study abroad credit, including dual degree, will be treated as transfer credit and will not be factored into cumulative GPA.
- Students may not have already graduated at the time of study abroad.
- Academic Misconduct will be taken into consideration as part of the approval process.
- Students will be subject to Rose-Hulman’s Code of Ethics while participating in study abroad.

Exceptions to the above policies may be considered for transfer students and on a case-by-case basis by the Center for Global Engagement.

A full listing of study abroad opportunities is available from the Center for Global Engagement.

INTEGRATED CIRCUIT TESTING CERTIFICATE

Testing integrated circuits is a critical element in the integrated circuit industry. In fact, testing has become the bottle-neck for many companies, with inefficient test programs preventing the release of products onto the market. With few colleges offering courses in this area, students at RHIT have a unique specialization opportunity, making them marketable and extremely valuable in the integrated circuit industry.

This certificate intends to provide the student with a solid background in test and product engineering and broaden that background with other courses pertinent to the test and product engineering field. A strong test/product engineer requires knowledge about integrated circuit design, systems design, board design, semiconductor fabrication, and statistics. Therefore, courses in these areas can be chosen for the elective portion of the certificate.

The test and product engineering certificate could be completed by an electrical or computer engineering student without overloading if the certificate courses are mapped to all but one of the Area, Technical, and Free electives. Electives have been chosen so that students can pursue the semiconductor certificate or a math minor in conjunction.

Certificate Requirements

ECE351: Analog Electronics is required.

Two of the three testing courses are required.

ECE557: Analog Test and Product Engineering
ECE558: Mixed-Signal Test and Product Engineering
ECE531: Digital Test and Product Engineering

Three of ten elective courses are required.

ECE551: Digital VLSI
ECE552: Analog Integrated Circuit Design
ECE553: RF Integrated Circuit Design
ECE343: High-Speed Digital Design (required for CPE program)
ECE416: Intro to MEMS
ECE419: Advanced MEMS
ECE454: System Level Analog Electronics

ECE557: Analog Test and Product Engineering (if not used for required testing course)
ECE558: Mixed-Signal Test and Product Engineering (if not used for required testing course)
ECE531: Digital Test and Product Engineering (if not used for required testing course)
PH405: Semiconductor Materials and Device I
EP406: Semiconductor Materials and Devices II
MA385: Quality Methods Engineering
MA387: Statistical Methods in Six Sigma

For further information about the certificate program, please contact Tina Hudson (hudson@rose-hulman.edu).

CERTIFICATE IN SEMICONDUCTOR MATERIALS AND DEVICES

The Certificate will consist of 20 credit hours of which 12 credit hours will be required courses. Students interested in pursuing this Certificate should see a PHOE certificate advisor (S. Kirkpatrick, Liptak, McInerney, Siahmakoun, Syed and Wagner). Students taking solid state/material science minor cannot take this certificate.

Required Courses

1. PH405 Semiconductor Materials and Applications -- 3R-3L-4C F Pre: PH113 or PH255 or PH265 or consent of instructor.
2. EP406 Semiconductor Devices and Fabrication -- 3R-3L-4C W Pre: PH405 or consent of instructor.
3. EP410 Intro to MEMS: Fabrication and Applications -- 3R-3L-4C S Pre: JR or SR standing or consent of the instructor.
   or:
   CHE440 Process Control 4R-0L-4C W Pre: CHE202

Electives

Course	Hours	Course Title
OE 450	4	Laser Systems and Applications
OE 485	4	Electro-Optics and Applications
PH 330	4	Material Failure
PH 401	4	Introduction to Quantum Mechanics
PH 440	4	X-rays and Crystalline Materials
EP 408	4	Microsensors
EP 411	4	Advanced Topics in MEMS
ECE 351	4	Analog Electronics
ECE 551	4	Digital Integrated Circuit Design

Course	Hours	Course Title
ECE 552	4	Analog Integrated Circuit Design
ME 302	4	Heat Transfer
ME 328	4	Materials Engineering
ME 424	4	Composite Materials & Mechanics
ME 415	4	Corrosion and Engineering Materials
CHE 314	4	Heat Transfer
CHE 315	4	Material Science and Engineering
CHE 440	4	Process Control
CHE 441	4	Polymer Engineering
CHEM 441	4	Inorganic Chemistry I
CHEM 451	4	Organic Structure Determination
CHEM 457	4	Synthetic Polymer Chemistry
CHEM 462	4	Physical Polymer Chemistry
MA 381	4	Intro to Probability with Applications to Statistics
MA 385	4	Quality Methods
MA 487	4	Design of Experiments

Overall aim of the Certificate

A certificate holder will understand how semiconductor devices work, have practical experience in the main stages of device production, have practical experience in the more common forms of device testing and characterization, and have broad understanding of the mechanical and chemical properties of the material used.

A Certificate holder will be well suited for jobs requiring an understanding of semiconductor devices and their production. These jobs include not only those directly related to device fabrication, but also those involved with testing and trouble-shooting electronic equipment and the design of machines that contain electronic equipment. The experience in simple device fabrication that the Certificate provides is particularly useful for future engineers in “process” industries.

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