COMPUTER INTEGRATED SURGERY, MINOR

https://lcsr.jhu.edu/computer-integrated-surgery-minor/

The Laboratory for Computational Sensing and Robotics in the Whiting School of Engineering offers a minor in Computer Integrated Surgery (CIS) for full-time, undergraduate students at Johns Hopkins. The minor is particularly well suited for students interested in computer integrated surgery issues who are majoring in a variety of disciplines including biomedical engineering, computer science, computer engineering, electrical engineering, and mechanical engineering. The minor provides formal recognition of the depth and strength of a student's knowledge of the concepts fundamental to CIS beyond the minimal requirements of their major.

To add the minor, please follow the instructions below:

1. Complete the CIS Advising Plan, outlining how you plan to complete the minor (you can find this on this page: https://lcsr.jhu.edu/computer-integrated-surgery-minor/).
2. Email the completed course checkout sheet to Dr. Taylor (rht@jhu.edu) (rht@jhu.edu) who oversees the CIS minor.
3. Email the approved checkout sheet to Alison Morrow (alison.morrow@jhu.edu) (Alison.morrow@jhu.edu).
4. Complete the SIS Online Form to add the minor.

For questions: Please contact Alison Morrow (alison.morrow@jhu.edu) (alison.morrow@jhu.edu).

For the most up-to-date information about the minor, please visit the website (https://lcsr.jhu.edu/computer-integrated-surgery-minor/).

Program Requirements

To satisfy the requirements for the minor in CIS, a student must have:

- a fundamental background in computer programming and computer science
- sufficient mathematical background
- take a minimum of six additional courses with a total of at least 18 credits directly related to the concepts relevant to CIS. These six CIS courses must include two fundamental CIS core courses, which provide the student with the fundamental basis for CIS, and four approved upper-level courses (300-level or above) to allow the student to pursue an advanced CIS topic in depth. The additional four upper-level courses must include at least one course designated as an "imaging" course or one course designated as a "robotics" course, as discussed below.

The student must earn at least a C- in each course. Graduate levels of the same course may be substituted for the undergraduate levels listed below without additional permission.

Code	Title	Credits
Fundamental Computer Science Courses		
EN.500.112	Gateway Computing: JAVA [1]	3
or EN.500.113	Gateway Computing: Python	
or EN.500.114	Gateway Computing: Matlab	
EN.601.226	Data Structures [1]	4
Fundamental Mathematics Courses [2]		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
or AS.110.106	Calculus I (Biology and Social Sciences)	
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
or AS.110.107	Calculus II (For Biological and Social Science)	
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
Select one of the following:		4
EN.553.291	Linear Algebra and Differential Equations	
AS.110.201	Linear Algebra	
AS.110.212	Honors Linear Algebra	
Fundamental Computer Integrated Surgery Courses		
EN.601.455	Computer Integrated Surgery I	4
EN.601.456	Computer Integrated Surgery II (or a design course in CIS (with advisor approval))	3
Other Upper Level Courses Related to CIS		
Select at least four other courses related to CIS. Of these, at least one must be in either the Imaging Subgroup or the Robotics Subgroup:		12-15
Imaging		
EN.520.414	Image Processing & Analysis	
EN.520.432	Medical Imaging Systems	
EN.520.433	Medical Image Analysis	
EN.601.461	Computer Vision	
Robotics		
EN.530.420	Robot Sensors/Actuators	
EN.530.421	Mechatronics	
EN.530.603	Applied Optimal Control	
EN.530.646	Robot Devices, Kinematics, Dynamics, and Control	
EN.601.463	Algorithms for Sensor-Based Robotics	
Other		
EN.520.448	Electronics Design Lab	
EN.530.445	Introduction to Biomechanics	
EN.580.471	Principles of Design of BME Instrumentation	
EN.601.454	Introduction to Augmented Reality	
EN.601.476	Machine Learning: Data to Models	
EN.601.482	Machine Learning: Deep Learning	
Total Credits		**42-45**

1. Or equivalent experience determined by your CIS minor advisor.
2. Each math requirement may be satisfied by one of the specific courses listed, or by an equivalent course as determined by CIS advisor.
3. A design course in CIS. Either EN.601.456 Computer Integrated Surgery II or a design course in biomedical engineering, electrical and computer engineering, or mechanical engineering with substantial CIS content approved by the student's faculty advisor in the CIS minor.

Please visit http://lcsr.jhu.edu/computer-integrated-surgery-minor/ for current course listings.