Faculty

Samy El-Tawab
Assistant Professor, Integrated Science and Technology
Dr. El-Tawab has conducted research in automatic control systems, his interest in robotics is focused on involving students in programming the robots, and advising projects that have a robotic component.

Kevin Giovanetti
Professor, Physics
Dr. Giovanetti has an active research program in experimental Particle and Nuclear Physics. His work in electronics and computing motivated his interest in robotics. While not an expert he enjoys the field immensely and happily supports students exploring this technology.

Jacquelyn K. Nagel
Assistant Professor, Engineering
Dr. J. Nagel has field and research experience with industrial automation and manufacturing robotics, and her primary interest is the role and design of sensors for automation. She advises engineering capstone projects and participates in youth outreach programs related to robotics.

Robert Nagel
Assistant Professor, Engineering
Dr. R. Nagel has performed research in the area of automated system design, and he actively advises engineering capstone projects related to robotics.

Gabriel Niculescu
Associate Professor, Physics
When not teaching physics classes or doing research in nuclear and particle physics, Dr. Niculescu is working to find and implement new ways to introduce more (and more, and more) robotics in the K-12+ curriculum.

Nathan Sprague
Associate Professor, Computer Science
Dr. Sprague has research interests in the areas of machine learning and computer vision. He teaches courses in Artificial Intelligence and Robotics, serves as the faculty advisor for the JMU Robotics Club, and is the Robotics Minor Advisor.

Anthony Teate
Professor, Integrated Science and Technology
Dr. Teate teaches courses in the Information and Knowledge Management concentration and the Intelligence Analysis program within ISAT. His primary interest in robotics is in UAVs and programming robots for autonomous behavior.

Roger Thelwell
Associate Professor, Mathematics and Statistics
Dr. Thelwell’s main interests in robotics concern dynamics and control, and in the mathematics of swarming behavior. He teaches courses about the theory and numerics of differential equations and chaos.

Kevin Molloy
Assistant Professor, Computer Science
Dr. Molloy performs research in the area of robotics, structural biology, and machine learning. Specific to robotics, his research focuses on dynamic design and motion planning algorithms. He teaches courses on Artificial Intelligence and introduction to programming.

For more information or to declare a Robotics minor please contact:

Dr. Nathan Sprague
Minor Coordinator
(540) 568-3312
spragunr@jmu.edu

www.jmu.edu/robotics
The cross disciplinary minor in Robotics is intended to offer STEM majors and other students with an interest in science and technology a fundamental understanding of scientific and technical issues involved in the design, construction and application of robots.

- Students will have a basic understanding of robot control systems, sensors, motion, circuits and the overall design of robots.
- Students will be able to design and develop autonomous robots and robot control software.
- Students will develop an understanding of how advances in robotics technology can be used in diverse real-life applications.
- Students will learn to work on a cross disciplinary team developing a technical product.

### JMU X-Labs

Many robotics courses and projects are conducted through the JMU X-Labs housed in Lakeview Hall. With its multidisciplinary courses, JMU X-Labs challenges students to investigate all aspects of a problem, collaborate with industry professionals and peers from different majors, iterate ideas and welcome meaningful failure to solve real problems. Courses are shared across departments and in collaboration with experts in various fields across the country.

### Curriculum

#### Required Courses

**Basic Preparation**

Choose one of the following:
- CS 139. Programming Fundamentals
- CS 149. Introduction to Programming
- IA 241. Introduction to Programming and Data Science
- ISAT 252. Programming and Problem Solving

Choose one of the following:
- MATH 232 Calculus with Functions II
- or MATH 235. Calculus I
- ISAT 151. Topics in Applied Calculus in ISAT

Choose one of the following:
- PHYS 140. College Physics
- and PHYS 140L. General Physics Laboratory
- or PHYS 240. University Physics I
- and PHYS 240L University Physics Laboratory I
- or ISAT 152. Topics in Applied Physics in ISAT

**Core Course**

Choose one of the following:
- CS 354. Introduction to Autonomous Robotics
- PHYS 386. Robots: Structure and Theory
- PHYS 387. Theory and Basic Principles of Mobile Robot Construction and Control

**Electives**

Choose at least six credits from the following:
- MATH 238. Linear Algebra and Differential Equations
- MATH 248. Computers and Numerical Algorithms
- MATH 341. Non-Linear Dynamics and Chaos
- PHYS 371. Digital Electronics
- PHYS 372. Microcontrollers and Their Applications
- PHYS 388. Robots for Humanity

#### Robotics Project Course

CISE 481. Robotics Project Summary

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1. A basic preparation course may be waived by the minor adviser if a student has completed a comparable course or experience.
2. Students who have completed the physical principles area of cluster 3 with a course not listed below should meet with the minor advisor.
3. At least one elective must be from a different department from the core course.
4. CISE 481 is intended to summarize a capstone robotics project experience. In order to register for CISE 481 you must have completed or be enrolled in an approved capstone, special topics, or independent study course that involves a robotics project. At the discretion of the Robotics Minor Advisor, you may also qualify for CISE 481 by completing an internship, research experience, or professional project that entails robotics design and/or development. Consult the Minor Advisor for more information.

### Organizations

#### JMU Robotics Club

The JMU Robotics Club is open to anyone at JMU with an interest in programming autonomous mobile robots. Club activities involve learning about robotics and programming robots to do amazing things. We meet weekly during the academic year in EnGeo 1203. Contact Dr. Sprague for more information: spragunr@jmu.edu.

#### FIRST LEGO League

JMU is the host in Virginia and DC for this international robotics program that engages 9-14 year olds in annual robotics competitions. Each year FLL teams design and build custom robots using the Lego Mindstorms platform in order to compete in regional tournaments in November and an exciting championship tournament at JMU in December. JMU students help to organize and staff the tournaments. For more information or to volunteer visit http://www.vadcfl.org.