ONLINE GRADUATE CERTIFICATE IN SYSTEMS ENGINEERING

Offered completely online, you are able to earn a graduate certificate at your convenience. With industry experts as your professors and course material that can be integrated into your work immediately, this program helps advance your professional value and credibility within the industry. Join a program that is filled with your peers, and that was designed by EMC leadership, to start your path to a better future.

Logistics
+ Next course begins April 9, 2015
+ Join the program in August, January or April (rolling admission)
+ Classes held asynchronously online
+ 3 courses per year

Curriculum
+ SYS 501. Concepts of Systems Engineering
+ SYS 510. Systems Architecture and Design
+ SYS 511. Systems Integration, Verification and Validation
+ SYS 579R. Requirements Engineering
+ SYS 579I. Introduction to Systems Thinking
+ Systems or Management course to be chosen by students

Online Education
For over 30 years, WPI has offered online education that mimics our on-campus experience. By completing your education online, you are able to participate in class and complete your assignments when it is convenient for you. Rather than having to stay late after work to attend class or drive to the WPI campus, you simply have to turn on your computer to attend classes.

The professors who teach classes online are the same ones who teach on campus. The quality and integrity of the material they are presenting represent the esteemed reputation of WPI.

Registration
You can register for the online Graduate Certificate in Systems Engineering by going to cpe.wpi.edu/+register.

Please note: Registering signals your intent to join the program.
WORCESTER POLYTECHNIC INSTITUTE

Worcester Polytechnic Institute is one of the nation’s premier science- and engineering-focused universities, founded in 1865. WPI’s founding motto of Theory and Practice continues to underlie our academic programs.

Our multidimensional approach to education yields more than just graduates; it helps create innovators, inventors, entrepreneurs, and more important, leaders. Graduates emerge ready to take on critical challenges in science and technology, knowing their work will impact and improve the quality of life.

CORPORATE AND PROFESSIONAL EDUCATION

At WPI Corporate and Professional Education, our definition of training and development does not merely mean increasing your knowledge base. To us, education is more than learning a new skill set. To remain relevant and achieve success in today’s competitive global marketplace, your organization must translate learning into results that produce value. We offer graduate programs, technical short courses, and professional development workshops and certificates that are customized specifically for your organization in order to address and solve real-time problems.

Our students are working professionals who want to further their education to enhance their knowledge and learn new tools and techniques to implement into their projects and organizations. WPI students do not simply take courses—faculty provide mentoring, hands-on exercises are incorporated into coursework, and cutting-edge methodologies used in today’s industries are taught.
SYS 501. Concepts of Systems Engineering
Systems Engineering is a multifaceted discipline, involving human, organizational, and various technical variables that work together to create complex systems. This course is an introduction and overview of the methods and disciplines that systems engineers use to define, develop, and deploy systems. It includes specific integrated examples, projects, and team building exercises to aid in understanding and appreciating fundamental principles. Topics covered include: Introduction to Systems Engineering; Requirements Development; Functional Analysis and Requirements Allocation; System Architecture and System Design; Integration, Verification and Validation; Trade Studies; Systems Analysis, Modeling and Simulation; Specialty Engineering; Risk Management; and Technical Planning and Management. (Prerequisite: an undergraduate degree in engineering or science, or permission of the instructor.)

SYS 510. Systems Architecture and Design
This course will study and contrast various important architectural frameworks, representations, tools, and methodologies in order to provide scalable and flexible approaches for enterprises operating in dynamic and complex environments. Enterprise-level system architecting tools will be discussed and demonstrated. At a minimum, the DoDAF, FEA, Zachman, and TOGAF architectural frameworks will be discussed in depth. Other topics will include analysis of architectural alternatives to meet physical and logical objectives and providing information and systems assurance in an environment that takes people, processes, and technology into account. Modeling tools such as UML/SysML and the use of model-driven architectures will be presented. Validation of the architecture with stakeholders will be discussed. Methods of identifying risks and opportunities associated with the architectural choice will be explored. Practical examples will be included for illustration.

SYS 511. Systems Integration, Verification and Validation
This course examines the use of Systems Engineering principles and best practices with respect to systems and systems-of-systems verification and validation (V&V). V&V processes, activities and methods as they apply across the product lifecycle will be examined. Case studies, papers and exercises will be used to examine the success and failure of verification, validation and test processes. Course topics include 1) How early systems engineering activities and solution sets affect integration, verification, validation and test; 2) V&V activities relative to product development phases; 3) Modeling quality, cost, time and risk; 4) Testing and non-testing methods; 5) V&V planning, execution and reporting; 6) Systems integration; and 7) V&V of critical and complex systems.

SYS 579R. Requirements Engineering
Requirements drive system definition and development. Properly managed requirements contribute to project success, while poorly defined and poorly managed requirements often lead to project failure. Modern systems are demanding even more attention to proper requirements definition and management. This course provides processes, techniques, and best practices necessary to develop and manage requirements in today's complex environments. (Prerequisite: SYS 501.)

SYS 579I. Introduction to Systems Thinking
Systems Thinking provides an arsenal of tools that enable program managers and systems engineers to better identify, understand, and control systems, and to improve their performance. In this course, we will study system identification and delineation, causal loops and feedback, system leverage points, delays and oscillations, mental models and unintended consequences, emergent properties, patterns, events, and self-organization, and use these tools to improve the performance of engineering, biological, business, and complex social systems. We will explore great system failures, how they might have been avoided, and how we can learn from them in developing and participating in current systems. Finally, we will learn how systems thinking explains the conflicting behavior of individuals, departments, businesses, and countries.
“Systems engineering has to address the areas of managing, plus it must address decomposing design problems and truing them into solutions. WPI’s Systems Engineering programs helped to accomplish this complex concept.”

M. Short
Manager, Systems Engineering
ClearEdge Power

“Of the four courses I’ve taken, all have been directly applicable to my work. It’s been difficult, and I don’t mean that in a negative way; I mean that it gives legitimacy to the online approach.”

M. Bryson
Executive Director, System Operations
PJM Interconnection

“Systems engineering has given me the understanding of how the complexity of a major engineering effort can be controlled and guided so that the customer gets what the customer wants. With this understanding, I am better equipped to contribute to the overall design efforts, and not only make a better product, but help those in my department do the same.”

M. Bonin
Senior Engineer in Reliability, Availability and Maintainability Analysis
General Dynamics Electric Boat
FREQUENTLY ASKED QUESTIONS FOR EMC EMPLOYEES

Interaction with Students and Faculty

Do online programs mean students will not interact with other students or faculty?
No. Communication among students is encouraged and often required. Through communication channels, such as e-mail, discussion boards, chat rooms and telephone, students regularly talk and develop a rapport with instructors and fellow classmates. In fact, many of our online students say they participate more in their online classes than they ever did as an on-campus student.

Do online courses require group work?
Classes are often divided into "project teams" to work on projects and assignments as groups - similar to the real workplace. Through our online programs, however, students never have to physically meet. Online students, who are often geographically separated, use the same tools that are used to deliver the course - such as on-line discussion forums - to meet virtually instead.

Technical Info

What are the technology requirements to access online courses?
Students must have access to a computer with compatible software either already installed, or which you have the ability to install, as required on a course by course basis. In addition, students are also expected to have the use of word processing and spreadsheet programs for the completion and/or preparation of class assignments, as well as high speed internet access for any online coursework. Click here to reference more information on technical requirements.

Other requirements:
- Some courses require a DVD-ROM drive and permissions to install software. Faculty will notify you of these requirements before the start of the class.
- All students will need a microphone input jack.

What do the terms asynchronous and synchronous communication mean?
These are technical terms that describe two distinct forms of communication. Asynchronous communication does not happen in real time, it occurs when the sender and receiver are involved in the process at different times such as posting a message on either an Internet-based or actual bulletin board. Synchronous communication occurs when the sender and receiver are involved in the process at the same time as in a face-to-face conversation or an electronic chat room. For synchronous communication, people must be located in the same physical or virtual place so they can ‘talk’ back and forth while for asynchronous communication they do not. This program will be delivered in an asynchronous format.

How are online courses delivered?
WPI faculty use a mix of media to deliver a first rate educational experience. The predominant delivery modes include web, video recording and videoconferencing. Technologies include online simulations, streaming audio and video, threaded discussions and more. Courses are structured so that students can go online or view video recordings as their schedule allows and according to the instructor’s syllabus.

How technical do online students have to be in order to succeed?
Students need to feel comfortable using a computer and have basic email, office and web surfing skills. If they use a computer at work or at home they should be able to successfully participate in any online course. Live technical support is available real-time at least fourteen hours a day.
How are tests/exams administered?
For the most part, online students take tests/exams at home and are given a set time duration to submit it to the professor. Students are also evaluated on projects, discussion boards, homework, etc.

Program Prerequisites
What do I need to participate in the certificate program?
This certificate recommends an ABET accredited undergraduate degree in engineering with a minimum cumulative average of 3.0.

Application Requirements
What is required to apply to the program?
- Completion of the online application form
- Official transcripts for all post-secondary colleges or universities, in English
  - If you have transcripts from outside of the U.S., please contact Stephanie Papia.
- TOEFL/IELTS - Proof of English language proficiency for applicants whose first language is not English. This is waived if within last five years you attended institutions in US, UK, Ireland, Australia, New Zealand, or Anglophone regions of Africa, Canada or the Caribbean for at least two years of full time studies.

Please note: Application materials are due prior to completion of first course, however, it is highly recommended that you apply prior to taking any courses.

Upon applying to the program, Stephanie Papia, your Operations Manager, will provide you with more information.

Cost and Payment
How much does the program cost?
Each 3 credit course is $3,975 for the 2014-2015 academic year.

When do I need to pay for a class?
Most programs require payment within 10 business days of the first class.

Does EMC offer tuition reimbursement?
EMC tuition benefits and compensation practices vary from country to country. Refer to your EMC Benefits and/or contact your local HR Business Partner for more information about your country’s tuition assistance options. Please adhere to EMC guidelines, and discuss with your manager prior to enrolling. All programs subject to manager approval.

Your WPI Contacts
Who do I contact with questions?
For questions about participating in the Graduate Certificate in Systems Engineering, please contact Amanda Maurer Keighley: maurer@wpi.edu.

For questions about admission, payment and other logistics, please contact Lori Kendall-Taylor: ltaylor@wpi.edu.