U of T Engineering Academy 2018 Request for Proposals - Instructions

Deadline: 12:00 PM on January 3, 2018

Primary Contact:

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Background Information

About the Engineering Outreach Office

The Engineering Outreach Office manages and administers the core outreach programs offered by the Faculty of Applied Science & Engineering at the University of Toronto. We act as a central unit for outreach activities promoting Science, Technology, Engineering, and Math (STEM) education to a wide audience.

The Engineering Outreach Office is dedicated to contributing to the development and education of the participants in our pre-university enrichment programs, and the undergraduate and graduate students who provide instruction and support them. We strive to ensure that the Faculty of Applied Science & Engineering at the University of Toronto prepares high school students, as well as undergraduate and graduate students, to be engaged global citizens who see the impact of their actions.

For more information about the Engineering Outreach Office, please visit:
http://outreach.engineering.utoronto.ca/

About U of T Engineering Academy

The U of T Engineering Academy is an opportunity for motivated high school students to engage with high school Math, Physics, Chemistry, and Computer Science curriculum in the lecture halls and labs of Canada's leading engineering school. Through a rigorous combination of classroom and experiential learning, including educational excursions throughout the city, students will prepare themselves for university while discovering the University of Toronto.

The 2018 season of U of T Engineering Academy will take place from August 7 to August 18, 2018. Tentatively, classes run from 9:00 am to 4:00 pm, with an hour-long break at noon. The UTEA courses are between two to five days in length and are offered to students who have completed grade 9, grade 10, or grade 11 during the 2017-18 school year.

For more information about U of T Engineering Academy, please visit: our website.

Description of Role

To provide high school students with a unique and challenging learning experience during the program, it is preferred that all instructors are currently in pursuit of either a Masters or PhD degree at the University of Toronto and have previous teaching experience. Instructors of this calibre serve as an inspiration for high school students while providing them with a taste of the university experience. Instructors generally come from the Faculty of Applied Science & Engineering at the University of Toronto; however, previous instructors have also come from other professional faculties including the Faculty of Pharmacy and the Faculty of Medicine. The Engineering Outreach Office also welcomes proposal submissions from recent alumni.

Please note the following:
- If an offer of employment is extended, it will be conditional upon the submission of a police records check clearance letter AND proof of WHMIS certification.
- The Engineering Outreach Office will not be accepting course proposals from instructors who wish to co-teach a course.
- There are **no** marking or evaluation assignments/duties for **non-credit courses**; however, the instructor may choose to produce problem sets, non-marked mini-assignments, or reading for the class depending upon the nature of the particular course.

Expectations

Training

All instructors must attend training. Training is tentatively scheduled to take place over two days; a day in February and a day in June/July. Training will cover program details, curriculum development, safety protocol, safety standards, classroom management, student issues and approaches to teaching and learning.

Preparation

The instructor is responsible for course preparation, including the preparation of and modification to the course outline, lesson plans and lecture notes/handouts, and field trips for each course as necessary. Successful applicants will receive all the required documents and forms to collect course information. These materials and equipment requests, as well as lessons and activity plans, must be submitted to the Program Coordinator by the specified dates, which occur prior to start of the course. It is the responsibility of the instructor to adjust any activities that are not approved by the department's safety officer.

The instructor is responsible for preparing audiovisual items to be used in class and will also set up any audiovisual equipment required (such as laptops and projectors). Lastly, the instructor is required to meet with the Junior Instructors prior to the specified date set by the Program Coordinator, and remain in close communication with the Junior Instructors until the delivery of the course.

The instructor is responsible for conceptualizing, designing and preparing any hands-on activities and experiments to be conducted in the course; this includes demos, prototypes, etc. The instructor is also responsible for finding any guest speakers, tours, etc. (Maximum 1 guest speaker per day.) Finally, the instructor should seek assistance from the Program Coordinator, as needed, in developing curriculum and hands-on activities. The instructor acknowledges that the content of the course will conform to the description of the course on the Outreach website and any other publications.

Preparation time is paid at a rate of 40 minutes per contact hour.

Contact

The instructor will be present in class at all times and will facilitate the entire course. The instructor is responsible for conducting lessons, facilitating class discussion and/or debate, conducting/demonstrating laboratory and design activities, and providing in-class assistance to the participants. Additionally, the instructor will lead any applicable course field trips. Finally, the instructor will mentor and engage Junior Instructors in meaningful tasks throughout the program.

Other

- Each instructor is required to meet with an Academic Team Leader at least once in May or June to go over logistics specific to their course(s).
- Instructors are responsible for leading their class from registration to their assigned lab/classroom on the first day of their course. On all other days, instructors will meet their students are the assigned lab/classroom. At the end of the day, student dismissal will take place as directed by the Program Coordinator.
- Instructors are required to comply with any safety procedures outlined in training.
- Instructors are expected to communicate any and all concerns and incidents to the Program Coordinator immediately. Documentation related to any incidents will be promptly completed by instructors.
- Instructors are required to complete all course feedback forms in a timely fashion and submit them to the Program Coordinator at the completion of each course.
- Instructors are encouraged to offer support and guidance, and demonstrate leadership to all UTEA participants being mindful that they are representing the Faculty of Applied Science & Engineering and the University of Toronto.
- Instructors will be asked to engage in digital or social media activities, including but not limited to, taking photos, posting videos, creating content for channels such as Facebook, Instagram, and Twitter, etc.)

Dates to Remember
- January 3, 2018: Requests for proposals close
- January 8, 2018: Interviews start for all selected applicants
- February 1, 2018: Conditional offers begin to be extended

Course Preparation:
- February 2018: Instructor Training (Day 1)*
- May 2, 2018: All final course documents due
- June 2018: Instructor Training (Day 2)*
- June/July 2018: Meeting with Academic Team Leaders and Materials Team
- June-July 2018: Meetings with Junior Instructors as needed

* Attendance at instructor training is required. Successful applicants will be advised of the date when it is finalized.

Application Guide

Before you fill out the Proposal Submission Form, you should gather all the required documents and information. This guide provides detailed instruction for each section of the form.

Part I: Application Information

Please enter your information (legal name, permanent address) as it should appear on your Offer of Employment.

Should your proposal be accepted, your biography will be posted on the Outreach website as a promotional piece for prospective participants and their parents. Note that your biography may be edited stylistically prior to posting. Visit the Outreach website for examples of an instructor biography. Please write your instructor biography from a third person perspective in Word and then copy and paste it into the online form field. Your biography should be no more than 500 words.

Employment Information

If you are unsure of your eligibility to work in Canada, please contact apply@engineeringoutreach.ca. U of T Engineering Academy offers courses from August 7 to August 18, 2018. In addition, the Engineering Outreach Office may offer similar programs in May, June or July. Availability of instructors will be reviewed prior to any additional programs.

Part II: Cover Letter, Résumé/Curriculum vitae

Please combine your résumé/CV and cover letter in one PDF file. Ensure that your name appears on every page of the document.

Your cover letter should include:
- any relevant employment experience such as practical teaching and/or industry experience,
- why you are applying for this position and how you hope to inspire the next generation of students,
- (returning instructors only) what you learned from your most recent Engineering Outreach teaching experience and explain how it has informed your proposal for 2018,
- (returning instructors only) why you want to come back for another year and teach Engineering Outreach programs again.

If you have a graduate studies supervisor, you are encouraged to discuss your interest in teaching with them and to let them know that you will be out of your lab or office during business hours for the days that you are teaching.

Three references may be requested if you are selected for an interview. Ideally, these references should be able to speak to your ability to convey complex information in an instructional setting and your ability to showcase your research while making it relevant to youth. It is preferred that one of your references is your graduate studies supervisor.

Part III: Course Proposal

UTEA aims to develop and offer courses that make meaningful connections between the high school curriculum and real-world applications. The courses are intended primarily for students who are successful in school and are looking for more challenges. Whenever possible, UTEA courses will showcase innovative research that is currently being conducted at the U of T Engineering.

Using the Course Proposal Template provided, upload your own proposal for the educational programming for each course you would like considered. Save the file as a single PDF file for upload.
- Be sure to include the course title, grade level, engineering discipline, and description for the course(s) you are submitting. The sample course outline includes sections for you to provide details about the types of hands-on activities you plan to facilitate, the materials you require, etc. If your course proposal is accepted, you will be asked for additional information regarding the specifics of what you require to effectively deliver your course(s)— materials, A.V. equipment, technology requirements, etc.
- In your course proposal, be sure to indicate how you might integrate or showcase either your own research or a research project (past or present) from another researcher at the University of Toronto

into your course. Also, please explain how the content you cover each day is being applied/may be applied to solve real world problems.

Course Details

If your course proposal is selected, the course description will be used in promotional materials. Please note that there will be an opportunity to edit/update any of this information prior to publication if necessary. Please note that the course description may be edited stylistically prior to posting.

We are particularly interested in attracting courses that address the four themes of our newest academic plan. Instructors are encouraged to make relevant connections between their proposed course and the four themes. These include:

- Bioengineering and human health
- Sustainability
- Data science and machine learning
- Advanced manufacturing and advanced materials

For preliminary planning purposes, please select the facilities that you require to effectively deliver your course.

- Classroom
  Movable tables and chairs, blackboard or whiteboards, projector (computer is not provided), screen, speakers

- Computer Lab
  One computer station per student; only the software listed is available in computer labs. Instructors are strongly encouraged to modify activities to use this software.
  Adobe Acrobat, Altair HyperWorks, Altera Quartus II, AMPL, ANSYS 17, ArcGIS, Aspen Engineering, Autodesk, Bloodshed Dev-C++, Bridge Point, BRugs, CATIA, CES Edupack, Codeblocks, CogLab, CPLEX Optimization Studio, Dynamic C++, ECLIPSE, Environment Canada Data Explorer, EPA SWMM, Fact Sage, Geovia Gems, Geovia Whittle, Ghost script, Ghost View, Google Earth, Google Sketchup, Gurobi, HECRAS, HOT2000 HTRI, INRO Emme, LAMMPS, LS-Dyna, MapTek Vulcan, Matlab R2016a, Microsoft Office 2013, Microsoft Visual Studio, Microsoft Visual Basic, MINITAB, MSC Adams, Nitica, OLI systems, Open Bugs, Palisade Decision, Protege, Prover9 and Mace4, Pspice, Putty, Python3, R, RETScreen, Rocscience, Runge, SAP 2000, S-Frame, SBEDS, Screen Pass, Screen Share, Silverlight, SIMUL8, SolidWorks, SolverStudio, SSH, Statfit, TaskArchitect, Talpac, Team Center Rich Client, Terra Analysis, UGS NX, USB serial drivers, Vesta, Vico, Visible Analyst, West Point Bridge Builder, WollFram CDF, Working model, WS-FTP, WinWULFF

- Laptops
  One laptop for every 3-4 students; custom software installations are possible

- Electronics Lab
  Soldering stations, power supply, signal generator, multimeter, oscilloscope

- Wet Lab
  Work benches, fume hood, microscopes, balances, glassware

- Other
  If you require highly specialized space or equipment, it is the responsibility of the instructor to assist the Engineering Outreach Office in arranging the use of it.

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Appendix I – Sample Course

Title: Adventures with Exponential Functions

Intended Audience: This course is intended for students who have completed grade 10 math (MPM2D). This is a preview of the Exponential Functions strand of grade 11 math (MCR3U). This course is not-for-credit.

Course Description: Exponential functions are everywhere! How quickly does your coffee cool on a hot day? How is compound interest different from simple interest? How are medical isotopes produced? Learn to construct mathematical models to explain things happening all around us.

	Day 1: Mathematical Models	**Day 2:** Growth and Decay
Proposed Activities	Introduction: Will It Hit the Hoop? Review quadratic model (grade 10 curriculum) of projectile motion. April Fools: Gmail Tap Construct and compare linear, quadratic, and exponential models for 2-key and 26-key keyboards. Discussion: Could a 2-key keyboard with predictive text work? Domino Skyscraper: "A smaller domino can topple a domino that is 1.5 times larger in every dimension." How would you topple over a domino the size of a skyscraper? Extension: The Toothpick Problem Exit Ticket: Which should you pick? ● Receive $10 each day ● Receive $0.01 on first day and double the amount on each following day.	Banking - Compound vs. Simple Interest Investigate savings accounts and borrowing options to build net worth models. Use data from Statistics Canada and CMHC to validate models. Population Growth with Candy: Build a function that models a relationship between the number of generations and the population (cell division). (Extension: adjust model for human population) Journey to the Centre of the Earth ("We're still falling!") Compare the position of falling object and time elapsed. Create equation that can be used to determine depth of a cave. Medical Isotopes General investigation: production, storage, uses, safety, etc.
Connections to Ontario Curriculum	- Physics, Grade 11 - Kinematics - Computer Science, Grade 11 - Data Types - Computer Science, Grade 12 - Recursive Functions	- Biology, Grade 11 - Population Dynamics - Biology/Chemistry/Physics, Grade 11 - Communication
Learning Outcomes	By the end of day 1, students will: ● collect data that can be modelled as an exponential function, through investigation ● graph an exponential relation ● Determine and describe key properties relating to domain and range, intercepts, increasing/decreasing intervals, and asymptotes for exponential functions ● distinguish exponential functions from linear and quadratic functions by making comparisons in a variety of ways ● solve problems using given graphs or equations of exponential functions arising from a variety of real-world applications	By the end of day 2, students will: ● collect data that can be modelled as an exponential function, through investigation, from primary sources ● Determine the roles of the parameters a, k, d, and c in functions of the form $y = af(k(x - d)) + c$ ● identify exponential functions, including those that arise from real-world applications involving growth and decay and explain any restrictions that the context places on the domain and range ● solve problems using given graphs or equations of exponential functions arising from a variety of real-world applications

Real-World Applications	Data science and machine learning	Bioengineering and human health
Materials	laptops with internet access (groups of 4), dominos, shoe boxes (various sizes), play money, handouts, graphing paper, flipchart paper (graph), calculators, rulers, pencil, erasers, markers.	laptops with internet access (groups of 4), candy (skittles, or smarties, etc), timers/stopwatches, mini glow sticks, handouts, graphing paper, flipchart paper (graph), calculators, rulers, pencil, erasers, markers.

	Data science and machine learning	Bioengineering and human health
	laptops with internet access (groups of 4), dominos, shoe boxes (various sizes), play money, handouts, graphing paper, flipchart paper (graph), calculators, rulers, pencil, erasers, markers.	laptops with internet access (groups of 4), candy (skittles, or smarties, etc), timers/stopwatches, mini glow sticks, handouts, graphing paper, flipchart paper (graph), calculators, rulers, pencil, erasers, markers.