DEEP Summer Academy 2018
Request for Proposals - Instructions

Deadline: 12:00 PM on October 25, 2017

Primary Contact:
Claire Heymans | Outreach Coordinator, DEEP and High School programs
Engineering Outreach Office
Faculty of Applied Science & Engineering
University of Toronto
T: 416-946-7029 | E: claire.heymans@utoronto.ca

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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 DEEP Summer Academy

The Da Vinci Engineering Enrichment Program (DEEP) Summer Academy provides well-rounded and highly motivated high school students from across Canada and around the world with the opportunity for advanced study in a variety of engineering, technology, business, and science disciplines. This program has been designed to expose participants to concepts well beyond the regular secondary school curriculum. DEEP Summer Academy reaches over 400 high school students each season.

The 2018 season of DEEP Summer Academy will take place from July 9, 2018 to August 3, 2018. Classes run from 9:30 am to 3:30 pm, with an hour-long break at noon. The majority of DEEP courses are one week in length (Monday to Friday) and are offered at either the Junior (grades 9 and 10) or Senior (grades 11 and 12).

For more information about DEEP Summer Academy, please visit:
www.deepsummeracademy.com.

Description of Role

To provide DEEP 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.
- With very few exceptions, the Engineering Outreach Office will not be accepting course proposals from instructors who wish to co-teach a course. If you wish to co-teach a course, your cover letters must clearly state what each applicant brings to the table and how co-instructing would be beneficial for the students in your class. Please note that course with two instructors will have an increased capacity of 40 participants.
- There are no marking or evaluation assignments/duties in DEEP; 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.

If you are proposing a repeat course, you are not expected to include your course proposal with your application. The Engineering Outreach Office wants to ensure that your course reflects the most current research in your field. Instead, your fully revised course outline will be due in early April.
Please note that that these updates and revisions are compulsory and an expectation of all instructors teaching a repeat course.

Expectations

Training

All instructors must attend training. Training is tentatively scheduled to take place over two days during the Winter 2018 Reading Week (February 19-25). 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 course counsellors prior to the specified date set by the Program Coordinator, and remain in close communication with the counsellors 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 (both, if team teaching) 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 course counsellors 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 required to be part of the opening and closing ceremonies as directed by the Program Coordinator.
- Instructors are responsible for leading their class from opening ceremonies to their assigned lab/classroom on Monday mornings. 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. Lastly, the instructors will lead their class to the closing ceremonies on Friday afternoons.
- 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 DEEP office at the completion of each course.
- Instructors are encouraged to offer support and guidance, and demonstrate leadership to all DEEP 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

- October 25, 2017: Requests for proposals close
- November 1, 2017: Interviews start for all selected applicants
- December 1, 2017: Conditional offers begin to be extended

Course Preparation:

- February 2018: Instructor Training *
- April 11, 2018: All final course documents due
- May-June 2018: Counsellor Meet & Greet
- May-June 2018: One-on-one meetings (Academic Team Leaders and Materials Team)
- June 2018: Meeting with course counsellors

* Attendance at instructor training is required. Successful applicants will be advised of the date when it is finalized. Training is tentatively scheduled for two days during the Winter 2018 Reading Week (February 19-25).

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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.

DEEP Summer Academy offers week-long courses from July 9 – August 3, 2018. In addition to the four weeks of DEEP, the Engineering Outreach Office may offer similar programs in May, June or August. Availability of instructors will be reviewed prior to scheduling DEEP and any additional programs.

Part II: Cover Letter, Résumé/Curriculum vitae

Please combine your résume/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 DEEP 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 DEEP again.

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

Three references will 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.

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Part III: Course Proposal

DEEP aims to develop and offer courses that are intellectually challenging, engaging and serve to encourage interest in the various Engineering disciplines offered by the Faculty of Applied Science & Engineering at the University of Toronto. DEEP Summer Academy is committed to showcasing innovative research that is currently being conducted at the U of T and demonstrating how it is being applied to solve real world problems.

Using the Course Proposal Template provided, upload your own proposal for 5 days of educational programming for each course you would like considered. Save the file as a single PDF file for upload.

1. Be sure to include the course title, grade level, engineering discipline, and description for the course(s) you are submitting. The sample 5-day 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.
2. Every DEEP course is assigned 2 to 5 undergraduate counsellors depending on course need. Please indicate in your proposal how you will engage these counsellors while teaching at DEEP. The goal of our office is to provide both an enriching experience for the students attending DEEP and all those working and teaching in the DEEP classrooms.
3. 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. DEEP courses will be organized by engineering discipline(s) that they relate to.

While DEEP 2018 will offer courses that showcase many research areas, we are particularly interested in attracting courses that address the four themes of our newest academic plan. These include:

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

Instructors are encouraged to make relevant connections between their proposed course and the four themes.

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, HEC-RAS, 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

Appendix I – Sample Course

Title: Great Challenges in Neuroscience

Proposed Grade Level: Senior (Grade 11 and 12)

Engineering Discipline: Biomedical Engineering

Course Description:

The past thirty years have seen incredible developments in the field of neuroscience. Improved technology and analysis techniques have supported an explosion of exciting scientific findings. Understanding of the brain is asking the right questions and learning the skills required to overcome the important problems. This course will explore some of the greatest challenges in the field. Students will work through labs on topics including neuroimaging analysis, signal processing and microbiology of the brain to learn skills and experience some of these challenges first hand.

Please refer to the two-page chart on the following page.

Theme	Course Introduction & Neuroscience Fundamentals	Challenge 1: Small data	Challenge 2: BIG data	Challenge 3: Signal processing in the brain	Student challenges: students present their proposed solutions to challenges from Day 1
Topics	Brain-basics. Challenges in the field: major advancements and major obstacles. How to approach challenges: asking the right questions, problem-solving	Microbiology of the brain. Important discoveries: neurogenesis, BDNF, neurotransmitters, optogenetics.	MRI overview: how this has changed our understanding of the brain How to analyze big data	How to measure neural activity: basic EEG technology overview, analyzing and modeling brain activity. Discuss how this facilitates important scientific developments.	Our potential for impact. How to make an effective presentation. Career focus: guest lecturer from industry, academia, and/or career services.
Proposed Activities	Ice-breakers Introduce counsellors. Lab safety training Activity: in groups of 3, students will visit researchers on UofT downtown campus to interview them about their biggest challenges.* Example questions: • What are the biggest hurdles for you in your career, this year, today • Can you imagine a tool (real or not-yet existing) that would solve some of these problems?	Identifying specific parts of the neuron from slides of sheep brain. Perform western blot, a method commonly used to identify certain proteins in a tissue or blood. Guest speaker: Dan Hosseinzadeh, Pathcore 30-60 mins: Work on classroom presentation of big challenges interviews	Neuroimaging tutorial: look at various MRI images, identify important structures, Neuroimaging analysis: using MATLAB, students will run an analysis of fMRI data (data previously acquired during a visual processing task). Guest Speaker: Someone from Randy McIntosh's lab, or Gregory Szilagyi 30-60 mins: Work on classroom presentation of big challenges interviews	Acquire EEG data with tools in IBBME lab. Use Matlab to analyze these data in computer lab: progress from basic analysis to advanced techniques. Use the signal processing toolbox to filter signals, plot an event-related potential. 30-60 mins: Work on classroom presentation of big challenges interviews	Students to present their week-long project: summarize their interview with U of T researchers, and propose their solutions to the problems. Researchers may be invited to attend the presentations, with the option to attend their specific group's presentation virtually, via teleconference or phone.
Learning Outcomes	Gain an understandig of the macroscopic and microscopic brain structure, understand the basic mechanism of memory formation and observe how advances in engineering have facilitated scientific discovery. Foster communication between scientists and	Students to learn a fundamental laboratory technique. Overcoming challenges of learning a new task, and gaining hands-on experience with a technique used to make relevant discoveries.	Students to gain an appreciation for the issues and benefits posed by big data: computational, statistical, logistical, ethical.	Students will learn about common diagnostic tools and develop an awareness of the need for critical evaluation. Foster communication between scientists and students. Exposure to signal analysis.	Students to learn that they have the potential to make a positive impact in an ever-expanding field. Students will also get some insight into how a career in the field could progress.

How is the content you cover each day being applied to solve real world problems?	Students will gain sufficient understanding of neuroscience concepts to understand how drugs affect the brain, and how technology being developed at UofT is improving rehabilitation (eg Milos Popovic's functional electrode stimulation).	Students to learn a fundamental laboratory technique used widely in microbiology labs.	MRI and EEG are critical tools in neuroscience, both for basic research and clinical diagnostics. In addition, data processing skills are vital for a successful career in all analytical fields.		Past senior med students have expressed interest in learning more about potential career paths in this field. In my opinion, the ability to conduct an effective presentation is as important as R&D.
Facilities Required (AM/PM)	Tutorial room	IBBME lab	IBBME lab	IBBME lab	Tutorial room
	Room for dissection	IBBME lab	IBBME lab	IBBME lab	Case room
Software/Hardware	Laptop (instructor to provide) Projector and speakers	Laptop (instructor to provide) Projector and speakers	Laptop (instructor to provide) Projector and speakers Computers with MATLAB	Laptop (instructor to provide) Projector and speakers Computers with MATLAB	Laptop (instructor to provide) Projector and speakers
Materials	6 Fixed sheep brains (1 per 4 students) basin, lab jackets, goggles, rubber gloves, dissection kits. Cameras with video for interviews.	Microscopes Slides prepared with tissue samples And/or we make our own with stains? Western blot equipment Gift for speaker	Gift for speaker	EEG equipment (in IBBME lab) Gift for speaker	