

Job Description

Job Title:	Laboratory Instructor
Department:	Chemical Engineering
Reports To:	Lab Director, Teaching
Jobs Reporting:	Teaching Assistants, Co-op Students
Salary Grade:	USG 9-12
Effective Date:	May 2023

Primary Purpose

The undergraduate curriculum in the Department of Chemical Engineering comprises its core chemical engineering program and two interdisciplinary programs, and all these programs offer mandatory stand-alone laboratory courses to students at all levels. Reporting to the Lab Director, Teaching, the Lab Instructors teach stand-alone undergraduate laboratory courses that are purported to enhance undergraduate student learning and success through a positive and hands-on learning environment within the established scope and guidelines of the professional degree programs.

The laboratory instructor positions are responsible for the effective delivery of assigned undergraduate laboratory courses and other associated academic responsibilities, and ensure that all laboratory facilities, equipment, and resources are properly maintained for the lab courses, and all laboratory experiments are appropriate and conducted safely. The Lab Instructors also collaborate with the laboratory teaching team and course faculty for the lecture-laboratory synchronization, creation of lab course contents, and development and design of new lab experiments to meet the need of the undergraduate program and the lab courses.

Key Accountabilities

Takes full academic responsibility for assigned courses and lab exercises

- Teach assigned laboratory courses in the undergraduate curriculum.
- Develops course syllabi including the course instructions, grading scheme, TA training, and web-based course material delivery where appropriate.
- Assigns lab groups and schedules for the lab experiments.
- Develops and gives instruction to students regarding course expectations and requirements.
- Assists with grading, assessing, and submitting final course grades.
- Responds to inquiries and appeals regarding grades.
- Potential responsibilities include any undergraduate course involving experimental and/or computational laboratory exercises. Subject to changes in the curriculum, these are represented by the following courses: ChE 101L, ChE 180L, ChE 181L, ChE 290, ChE 291, ChE 390, ChE 490, ChE 491, NE 220L, NE 226L, NE 330L, NE 454C, NE 455C.

Ensures smooth operation of assigned undergraduate Chemical Engineering laboratories:

- Maintains existing laboratory experiments and the apparatus associated with them
- Prepares and provides chemical and equipment preparation trainings and other materials required in the laboratories for coop students and lab assistants.
- Provides up-to-date manuals and/or written handouts about each experiment or exercise, with specific emphasis on safety, equipment preparation, problems potentially encountered during an experiment, and data analysis

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- Works with other teaching staff to ensure that all experiments in all courses work when classes meet
- Maintains familiarity with knowledge of the operation of special laboratory equipment, including analytical instruments, data measurement devices and meters, general and unit operation equipment, and biological materials and biolab equipment such as bioreactors, microscopes
- Handles paperwork associated with the purchase and repair of laboratory equipment, supplies, and inventory
- Provides technical support for the purchase of new laboratory equipment and recommendations for replacement of laboratory equipment
- Develops proposals to raise funds through WEEF or other sources to upgrade and/or purchase equipment for existing and new experiments
- Supervises health and safety aspects of undergraduate laboratories for all students, teaching assistants, and others

Develops and constructs new chemical engineering undergraduate experiments, including exercises based on engineering software applications

- Develops new course contents and manuals including lab experiments with new and up-to-date technology or engineering practice as well as contents for computer labs.
- Initiates the development of new experiments and exercises on a continuous basis
- Works with other teaching staff and faculty in the development of new experiments and exercises
- Makes improvements to existing experiments and exercises so that they are more suitable for achieving educational goals in the context of chemical engineering education
- Works with other teaching staff to ensure that all the chemical engineering lab exercises have consistent expectations and practices, where possible

Ensures the effective utilization, deployment, and development teaching assistants who are assigned to assist with undergraduate laboratories from term-to-term on a changing basis

- Develops training materials and provides lab demonstration for lab course TAs
- Provides new teaching assistants with supervision and instruction on experiments and design exercises before each term's laboratory sessions begin
- Supervises teaching assistants who assist and oversee the students performing the experiments and exercises

Maintains and develops professional training

- Performs library searches, reading, and professional training to remain current with developments in chemical engineering and education
- Participates in Chemical Engineering Education conference activities, when opportunities arise, to assimilate best practices
- Maintains professional engineering licensure in Ontario

**All employees of the University are expected to follow University and departmental health and safety policy, procedures and work practices at all times. Employees are also responsible for the completion of all health and safety training, as assigned. Employees with staff supervision and/or management responsibilities will ensure that assigned staff abide by the above, and actively identify, assess and correct health and safety hazards, as required.*

Required Qualifications

Education

- MSc or PhD in Chemical Engineering or equivalent education and experience.
- Professional engineer (P.Eng.) status or eligibility in the Province of Ontario is a requirement.

Experience

- Three years of experience in teaching undergrad students or equivalent industrial training or managing lab operations is preferred.

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- Experience in chemical engineering test and measurement instrumentation and/or software, running labs, troubleshooting lab equipment; giving tutorials/lectures and demonstrations, writing and updating lab manuals, developing new labs, marking reports, and evaluating technical presentations is strongly preferred.
- Experience in computational and simulation software, such as Python, MATLAB, Aspen Plus, or other chemical process simulation and optimization software.
- Experience working with all core areas of chemical engineering, including experience in the design, operation and process control of pilot scale experiments is a strong asset.
- Experience monitoring and enforcing safety in the labs or a similar environment.
- Experience in purchasing chemical engineering laboratory and pilot-scale equipment is an asset

Knowledge/Skills/Abilities

- Knowledge of all core areas of chemical engineering as well as the operation of ChE lab equipment and measurement apparatus.
- Knowledge of data acquisition and control as well as measurement instrumentation including computer interfacing with measurement instrumentation.
- Programming skills with Python or MATLAB for engineering computation and simulation.
- Proven aptitude for teaching and a strong sense of pedagogy and how it is applied to a diverse and changing group of undergraduate students
- Excellent written and oral communications including strong technical documentation and presentation skills
- Strong organizational, problem solving, and analytical skills are essential
- Approachability, consistency, and the ability to motivate and earn students' trust.
- Self-motivation in taking initiatives to improve the quality of labs, teaching, and working environment is required
- Demonstrated ability to work independently and as part of a team within a busy and dynamic environment
- Proven experience in monitoring and enforcement of safety in lab environment in accordance with university and government policies and regulations.
- Proficiency with Microsoft Office suite of programs.

Nature and Scope

- **Contacts:** Internally, the incumbent communicates with undergraduate students in the laboratory course taught, teaching assistants, and co-op students in laboratory settings. Communicates with the Lab Director, Teaching, as required, course instructors in the area of specialization, and the chemical engineering staff and faculty members. Externally, the incumbent possesses ability to communicate with contacts relevant to accomplishing the laboratory delivery objectives as well as with equipment and/or lab consumable suppliers.
- **Level of Responsibility:** The Chemical Engineering Laboratory Instructor works per the assigned lab courses and instruction schedule, on his/her own initiative, with minimal daily supervision, and reports to the Lab Director, Teaching. The Laboratory Instructor is responsible for the supervisions of teaching assistants assigned to assist with the undergraduate laboratories from term-to-term on a changing basis as well as undergraduate lab assistants working in the undergraduate labs on a termly basis.
- **Decision-Making Authority:** The Lab Instructor works independently with the assigned laboratory courses and makes decisions typical of those associated with an undergraduate laboratory instruction and operation. The incumbent must identify solutions e.g. lab exercises not working well and work out a timely solution based on course objectives as well as perform the assigned duties in accordance within defined practices, procedures and policies.

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- **Physical and Sensory Demands:** Moderate demands, typical of a technical position operating within a teaching laboratory environment that may involve some lifting of equipment, rearranging of furniture, and standing for extended periods of time. Person must be able to project his/her voice to communicate with students in a laboratory setting. Requires exertion of physical or sensory effort resulting in slight fatigue, strain, or risk of injury.
 - **Working Environment:** Undergrad laboratories and office are located in an engineering building where there may be some unavoidable exposure to dangerous situations or hazardous substances or environments. Some laboratories may require working with hazardous chemicals, electro-mechanical equipment, or other hazards. In almost all the cases, safety procedures must be strictly enforced. Most of the working time is spent on teaching labs or in the office, working with teaching assistants and undergraduate students, or preparing equipment and materials for the labs. Hours of work is 37.5 hours per week. Lab space and scheduling restrictions may necessitate after-hours work. Work outside of normal hours may be occasionally required to deal with emergencies, maintenance, or upgrades.