

Job Description

Job Title:	Lab Director, Teaching
Department:	Chemical Engineering
Reports To:	Department Chair, Chemical Engineering
Jobs Reporting:	Lab Instructors, Chemical Engineering Lab Instructors, Nanotechnology Engineering Teaching Assistants Coop Students
Salary Grade:	USG 13
Effective Date:	December 2022

Primary Purpose

The Laboratory Director is directly accountable to the Chair of Chemical Engineering to provide senior operational and managerial support for the undergraduate teaching laboratories. The Lab director directly manages and oversees the undergraduate lab course instruction and lab operations performed by lab instructors, teaching assistants and co-operative students in Chemical Engineering program, and assumes the managerial responsibility for lab instructors in Nanotechnology Engineering program. The undergraduate teaching labs in the two engineering programs deliver the credit-based laboratory courses for a combined undergraduate population of more than 1,100 students, and support the short and long-term stability and sustainability of student laboratory learning. The Lab Director ensures that all laboratory facilities, equipment, and resources meet the needs of the undergraduate teaching labs, and that the instructional design, contents, and skill development of the lab instructors are sufficient to deliver all the required lab courses, capstone design projects, and workshop courses. The lab director also works closely with the Associate Chair Undergraduate Studies and is a member of the Undergraduate Review Committee.

The Lab Director provides leadership in short and long-term operational planning including managing laboratory operating expenditures, sourcing capital equipment, and recommending and managing renovation projects for the undergraduate teaching labs. The Lab Director has overall accountability for the design and fabrication of lab apparatuses and is required to have broad knowledge of and experience in pilot-scale equipment design and operation, instrumentation, and software for data acquisition and process control.

The Lab Director is expected to teach at least three lab courses in Chemical Engineering and oversee lab course instruction performed by ChE Lab Instructors and Teaching Assistants (TAs). As such, the Lab Director must be competent in all core areas of chemical engineering as well as in process equipment, numerical computation and process simulation, and computer data acquisition and control, and capable of providing an advanced level of guidance, instruction and technical assistance to lab instructors, teaching assistants, and undergraduate students.

Key Accountabilities

Managing Undergraduate Lab Operations

- Manages the overall operation of the undergraduate teaching labs and computer labs in alignment with the objectives of the department.
- Collaborates with the department and lab instructors to ensure that materials and skill development are properly coordinated.

- Advises the department on the effective utilization, maintenance, renovation, and repair of the undergraduate labs and laboratory improvement.
- Provides technical advice and expertise for the design, purchase, and installation of new laboratory equipment and technology as well as recommendations for the modification and replacement of laboratory equipment.
- Resolves differences with respect to course/lab delivery between faculty and instructors or conflicts related to equipment usage, scheduling, and TA staffing during lab times.
- Leads and oversees efforts to obtain funding from Waterloo Engineering Endowment Foundation and other bodies for new or improved laboratory experiments and activities.
- Participates in the department's efforts and initiatives in promoting the program and improving student experience
- Participates in the Undergraduate Review Committee and the Accreditation Committee to facilitate curriculum development and improvement associated with laboratory courses.
- Manage the 4th year design lab, supports students with ordering materials for their Capstone Engineering Design projects, and provides access to work space and equipment needed for the development of their prototype designs.
- Ensures teaching labs meet or exceed technical, professional and safety standards in compliance with licensing authority, legislative requirements, and University policy/procedures;
- Ensures lab instructor and teaching assistant training and instructional materials remain current as the curriculum evolves.

Staff Management for Teaching and Services

- Reviews lab staff structure and lab instructional and technical needs, and makes recommendations for changes when required, as well as succession planning.
- Supervises a team of lab instructors, assigns work activities, projects, monitors work flow and balance, and assigns work priorities in the context of the undergraduate teaching laboratories and lab courses.
- Manages the recruitment, selection, and hiring of lab Instructors in conjunction with the Chair, group faculty members, and Administrative Officer.
- Assesses the lab teaching staff, conducts annual staff performance appraisals, and evaluates and conducts the job promotion and disciplining of staff with the Chair.
- Manages the professional development and trainings of the lab instructors, and works with staff to identify short-term and long-term goals.
- Manages teaching assistants and coop students who work in the undergraduate teaching laboratories.
- Provides guidance to staff regarding ambiguous, non-routine multi-disciplinary challenges which are typically encountered in the day-to-day operation of the labs.

Teaching

- Teaches and/or teaches as the lead instructor for at least three lab courses per year, especially senior level lab courses with incorporation of design/simulation into open-ended project-based laboratories.
- Evaluates and adopts appropriate teaching techniques, assessment tools, and technologies to enhance student learning experience and proficiency;
- Ensures theoretical principles and technical contents in all the lab courses are current and in alignment with the lecture courses and the department's objectives for lab courses.
- Collaborates with faculty members to modify existing experiments and creates new labs to ensure seamless connection between lab exercises and lecture courses.
- Ensures common format is maintained for lab manuals and new lab exercises.
- Applies and upholds academic regulations in collaboration with course instructors.

- Incorporates current innovations such as online labs and process simulations into the lab curriculum and pedagogical practice.
- Ensures continual development of design-related relevant laboratory projects/cases to meet the needs of the students-centered experiential learning in lab courses.
- Leads pedagogical research into lab course instruction and develops research-based pedagogical design and instruction methods to ensure effective, efficient, and sustainable delivery of all the laboratory courses in the department.
- 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 101, ChE 121, ChE 180, ChE 181, ChE 290, ChE 291, ChE 390, ChE 490, ChE 491, ChE 482/483, ChE 524.
- Where abilities, interests, and opportunities exist, delivers undergraduate lecture courses and/or tutorials in the chemical engineering program.

Consultations and Services

- Provides expertise relating to design of lab courses and advises on technologies to be used with undergraduate teaching.
- Participates in strategic planning to improve the delivery of undergraduate lab courses, student learning experience, and undergraduate teaching labs.
- Ensures continual improvements to the lab course structure and content, including modification or redesign of lab materials or development of innovative materials for new courses.
- Ensures personally and through oversight that the enhancement of the student learning experience in lab courses through the adoption and development of innovative teaching initiatives and technologies.
- Ensures personally and through oversight that the developed experimental test cases for labs adhere to professional and scientific methodologies in a consistent and complementary fashion to their academic counterparts.
- Participates as an advisor for senior level student design projects.
- Provides expert, broad, and multi-disciplinary professional guidance to undergraduate students taking workshop and project courses throughout the entire undergraduate program.
- Provides interpretations of all external codes, regulations, specifications, as well as internal policies and procedures.
- Oversees the design of the fabrication of lab apparatuses/equipment and consults on the development of complex laboratory experiments.
- Advises and participates in promoting the department and the engineering profession through lab demos and open houses.

Other Responsibilities and Duties

- Member of the department's operations committee providing planning, expertise, and issue resolution related to the undergraduate teaching labs.
- Recommends and facilitates the introduction of new technologies and methods to enhance efficiency and streamline procedures.
- Special project analysis, reporting and other duties as required.
- 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.) in the Province of Ontario is a requirement.

Experience

- Minimum 5 years of experience managing lab operations, and supervisory/managerial experience.
- Minimum 10 years of experience teaching undergraduate students in a university environment required.
- Must have experience working with all core areas of chemical engineering, including experience in the design, operation and process control of pilot scale lab equipment and experiments.
- Demonstrated leadership, supervisory and management skills, including work planning, assignment, review/evaluation, and the training of staff in work procedures for a minimum of 5 years.
- Proven experience in monitoring and enforcement of safety in lab environment in accordance with university and government policies and regulations.
- Must be experienced with, or have the demeanor and desire to interact with students in a professional manner to provide technical advice and instructional materials.

Technical Knowledge/Skills/Abilities

- Proven aptitude for teaching, 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/facilitation skills.
- Excellent interpersonal, analytical, organizational, and creative problem solving skills.
- Demonstrated ability to work independently and as part of a team within a busy and dynamic environment.
- Excellent leadership and supervisory skills with the proven ability to mentor and develop staff.
- Knowledge of LABVIEW software for data acquisition and control as well as instrumentation.
- Intermediate to advanced programming skills with MATLAB and Python for engineering computation and simulation and Aspen Plus simulation/optimization software.
- Proficiency with Microsoft Office suite of programs.

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- Ability to design, modify, and troubleshoot pilot scale process equipment.
- Ability to interact with people from a wide variety of backgrounds and cultures in a tactful, professional and diplomatic way.
- Well-developed relationship building and conflict resolution skills.

Nature and Scope

- **Contacts:** Internally, the incumbent will communicate regularly with the Chair, Associate Chair Undergraduate Studies, Lab Instructors, Lab Teaching Assistants, Undergraduate Review Committee, Accreditation Committee, Undergraduate Advisors, Administrative Officer, Finance Administrator within Chemical Engineering and Nanotechnology Engineering, Co-op students hired for all the UG lab courses. Additionally, the incumbent will present information to students with regard to labs and workshop courses. The incumbent must have the proven ability to establish, maintain, and foster positive and harmonious working relationships with colleagues. S/he uses persuasion to elicit the cooperation of others. S/he liaises with other University departments including Human Resources, Registrar's Office, Procurement, Cooperative Education, Plant Operations, etc. S/he communicates with Human Resources and other departments to obtain, clarify and discuss information to resolve issues. Externally, the incumbent will contact vendors/suppliers/manufacturers for purchasing and maintaining equipment. S/he acts as liaison with external contractors with respect to all new construction and renovations of undergraduate labs.
- **Level of Responsibility:** This position is responsible for the administrative operations of the undergraduate teaching labs and provides guidance to Lab Instructors, Lab Teaching Assistants, etc. The position has specialized work with minimal supervision and has direct reports reporting to it. The incumbent must act independently in determining alternative solutions but if needed consults with various areas to seek resolution and reports any unusual issues to the Chair for action and resolution.
- **Decision-Making Authority:** This incumbent works independently with a high level of initiative and flexibility. The job requires regular independent action within defined policy parameters to provide informed advice and instruction to all stakeholders. Given the broad and in-depth technical expertise required to resolve ill-defined and highly unstructured problems that surface regularly, the incumbent must have practical and theoretical knowledge acquired through a multi-disciplinary engineering background. The impact and scope of these duties requires the use of discretion and judgement. The incumbent must be able to make thoughtful, informed and rational decisions to resolve issues or problems that arise. S/he makes staffing decision typical of those associated with a management position, in conjunction with the Chair and Administrative Officer. S/he is responsible for staff supervision and workload balancing, including assessing work performance and taking corrective action. The incumbent makes independent decisions typical of those associated with an undergraduate lab instructions and operations. S/he makes decisions about the best way to document and communicate policies and procedures.
- **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. The incumbent must be able to project his/her voice to communicate with students in a laboratory setting. Requiring exertion of physical or sensory effort may result in slight fatigue, strain, or risk of injury.
- **Working Environment:** Minimal exposure to disagreeable conditions typical of a supervisory position. High volume of work, constant interruptions, and time-sensitive decision-making are routine. In certain cases safety procedures must be strictly enforced. The undergraduate teaching 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. Most of the working time is spent on lab management and teaching either in the teaching labs or in the office,

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working with staff, 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.