Molecular Science and Software Engineering

The Master of Molecular Science and Software Engineering (MSSE) is a two-year, part-time, online professional degree offered by the College of Chemistry in collaboration with the College of Engineering. The program combines the immense intellectual resources of UC Berkeley with online courses created by world renowned experts and committed faculty in the training of the next generation of leaders in molecular science and software engineering. At MSSE. we believe that progress in science and technology will come from the rich combination of ideas that only a well-trained multidisciplinary and diverse workforce can create. Therefore, one of the central missions of MSSE is to use the power of the internet to expand the reach of the extraordinary educational content at UC Berkeley to increase the involvement of women and underrepresented minorities as next generation leaders in computational science and software engineering.

Minimum Requirements for Admission

The following minimum requirements apply to all graduate programs and will be verified by the Graduate Division:

1. A bachelor's degree or recognized equivalent from an accredited institution;
2. A grade point average of B or better (3.0);
3. If the applicant has completed a basic degree from a country or political entity (e.g., Quebec) where English is not the official language, adequate proficiency in English to do graduate work, as evidenced by a TOEFL score of at least 90 on the iBT test, 570 on the paper-and-pencil test, or an IELTS Band score of at least 7 on a 9-point scale (note that individual programs may set higher levels for any of these); and
4. Sufficient undergraduate training to do graduate work in the given field.

Applicants Who Already Hold a Graduate Degree

The Graduate Council views academic degrees not as vocational training certificates, but as evidence of broad training in research methods, independent study, and articulation of learning. Therefore, applicants who already have academic graduate degrees should be able to pursue new subject matter at an advanced level without the need to enroll in a related or similar graduate program.

Programs may consider students for an additional academic master's or professional master's degree only if the additional degree is in a distinctly different field.

Applicants admitted to a doctoral program that requires a master's degree to be earned at Berkeley as a prerequisite (even though the applicant already has a master's degree from another institution in the same or a closely allied field of study) will be permitted to undertake the second master's degree, despite the overlap in field.

The Graduate Division will admit students for a second doctoral degree only if they meet the following guidelines:

1. Applicants with doctoral degrees may be admitted for an additional doctoral degree only if that degree program is in a general area of knowledge distinctly different from the field in which they earned their original degree. For example, a physics PhD could be admitted to a doctoral degree program in music or history; however, a student with a doctoral degree in mathematics would not be permitted to add a PhD in statistics.
2. Applicants who hold the PhD degree may be admitted to a professional doctorate or professional master's degree program if there is no duplication of training involved.

Applicants may apply only to one single degree program or one concurrent degree program per admission cycle.

Required Documents for Applications

1. **Transcripts:** Applicants may upload *unofficial* transcripts with your application for the departmental initial review. *If the applicant is admitted,* then *official* transcripts of all college-level work will be required. Official transcripts must be in sealed envelopes as issued by the school(s) attended. If you have attended Berkeley, upload your unofficial transcript with your application for the departmental initial review. *If you are admitted,* an official transcript with evidence of degree conferral *will not* be required.
2. **Letters of recommendation:** Applicants may request online letters of recommendation through the online application system. Hard copies of recommendation letters must be sent directly to the program, not the Graduate Division.
3. **Evidence of English language proficiency:** All applicants who have completed a basic degree from a country or political entity in which the official language is not English are required to submit official evidence of English language proficiency. This applies to institutions from Bangladesh, Burma, Nepal, India, Pakistan, Latin America, the Middle East, the People's Republic of China, Taiwan, Japan, Korea, Southeast Asia, most European countries, and Quebec (Canada). However, applicants who, at the time of application, have already completed at least one year of full-time academic course work with grades of B or better at a US university may submit an official transcript from the US university to fulfill this requirement. The following courses will not fulfill this requirement:

   - courses in English as a Second Language,

   - courses conducted in a language other than English,

   - courses that will be completed after the application is submitted, and

   - courses of a non-academic nature.

If applicants have previously been denied admission to Berkeley on the basis of their English language proficiency, they must submit new test scores that meet the current minimum from one of the standardized tests. Official TOEFL score reports must be sent directly from Educational Test Services (ETS). The institution code for Berkeley is 4833. Official IELTS score reports must be sent electronically from the testing center to University of California, Berkeley, Graduate Division, Sproul Hall, Rm 318 MC 5900, Berkeley, CA 94720. TOEFL and IELTS score reports are only valid for two years.

Where to Apply

Visit the Berkeley Graduate Division application page (http://grad.berkeley.edu/admissions/apply/).

The program is designed for recent graduates and individuals with several years of professional experience. Candidates are required to provide evidence of the following to be considered for the program.

- B.A. or B.S. in a physical science or engineering discipline from an accredited institution.
- Transcript from every post-secondary school ever attended.
- Prior coursework in linear algebra and multivariable calculus, and chemistry, materials, or physics.
- Prior exposure to programming methodology.
- Minimum grade-point average (GPA) of 3.0 (B) on a 4.0 scale.
- Minimum TOEFL score of at least 90 for the Internet-based test (IBT) or 570 for the paper-based format (PBT) or at least a 7 on a 9-point scale for the IELTS, as appropriate

The most current MSSE curriculum for this program can be found at chemistry.berkeley.edu/grad/chem/msse/curriculum (https://chemistry.berkeley.edu/grad/chem/msse/curriculum/). More detail will be posted in the Guide as it becomes available.

Standing at the intersection of computational science, data science, management, and software engineering, MSSE is a unique program that provides critical thinkers with the practical skills needed to develop sophisticated computational models to solve large-scale challenges. Our degree provides the formal preparation in basic computational science practices, from algorithms to software that is usually missing from the undergraduate or graduate curriculum. Our program integrates numerical approaches to solving complex problems with software best practices to enable students to become effective scientific and engineering leaders. Our students graduate with the abilities to translate highly sophisticated theory, models, algorithms, and data analytics into software frameworks that others can use or build upon. MSSE provides:

- Computational tools to comfortably work within a range of scientific domains, including molecular simulation, quantum chemistry, machine learning, and deep learning.
- Software engineering practices to develop software frameworks that others can use or build upon.
- Data science tools to develop sophisticated analytics models for the interpretation and integration of large, complex datasets.
- Leadership, management, and entrepreneurial skills with an ethics focus.
- Practical skills through capstone projects based on real-life, multidisciplinary applications.