GRADUATE STUDENT HANDBOOK

PH.D. PROGRAM

in

COMPUTATIONAL and SYSTEMS BIOLOGY

offered by

Claremont Graduate University

In cooperation with

Keck Graduate Institute of Applied Life Sciences
Computational and Systems Biology examines biological systems through mathematical analysis, numerical simulation, data collection, refinement and improvement of models based on comparison with experimental data and the development of theories to enhance our understanding of biological systems. Fields of modern genetics (including genomics and proteomics) and molecular and cell biology are the current focus of research in systems biology. Myriad computational tools including deterministic and stochastic modeling, Monte Carlo simulations, data mining and data analysis are needed in approaching these problems. Applied mathematical topics including nonlinear dynamical systems (discrete and continuous), partial differential equations, probability and statistics, linear algebra, network theory, numerical analysis, control theory, asymptotic and perturbation methods provide some of the fundamental tools needed to carry out the requisite modeling and analysis.

The PhD program in Computational and Systems Biology will train scientists, mathematicians, engineers, and quantitative biologists in modern approaches in the life sciences. A combination of coursework, independent study, optional laboratory rotations and individual mentoring will provide a strong grounding in biology and genomics as well as in mathematical methods needed for modeling and computational work.

This Graduate Student Handbook for the program contains important information about the mechanics of the program. Students enrolled in the program are encouraged to read the handbook carefully and especially to be aware of the important milestones leading to successful completion of the program.
A. General Information

Degree Designation

The degree shall be designated as a Doctor of Philosophy in Computational and Systems Biology degree and shall be granted at the Claremont Graduate University (CGU). The diploma shall specify that it is being granted only when requirements have been satisfied as specified by both CGU and KGI.

It is expected that the student will complete all degree requirements, including appropriate coursework, advancement to candidacy, submission of the Dissertation, and oral defense of the Dissertation within approximately five years of admittance to the program.

Program Supervision and Administration

Overall program supervision will be the joint responsibility of a graduate faculty group at CGU and KGI. A Program Coordinator who is a member of the faculty, will be appointed at each campus. The two Program Coordinators will oversee the operation of the program, advise students, appoint preliminary advisors and recommend appointments to Doctoral Committees.

However, note that the CGU School of Mathematical Sciences will be the primary administrative office. It will process forms for advancement to candidacy, check program requirements, conduct formal dissertation review services, issue diplomas, and send notices to students. All this will be done in concert with appropriate units at KGI.

Admissions Requirements

Students must apply to CGU in accordance with the deadlines posted on the CGU website (www.cgu.edu). Admission will be granted to a limited number of qualified students, and therefore application should be made as early as possible. Applications are encouraged from both men and women, and particularly from members of minority and underrepresented groups.

An Admissions Committee consisting of faculty members from both institutions will review applications. The Admissions Committee has the responsibility of deciding admissions, consistent with campus regulations. The admissions review process may include personal interviews of applicants.

To be admitted to the Joint Ph.D. Program, an applicant must have:

- A baccalaureate degree in mathematics, or a scientific or engineering discipline from an accredited institution. Applications from outstanding candidates with degrees in other areas may be accepted conditionally; normally, these students will be expected to take, during their first year of enrollment, the necessary coursework to eliminate deficiencies in their backgrounds.
- An undergraduate Grade Point Average of at least 3.0, and of at least 3.5 in any previous graduate work, for the application to be competitive.
- Suitable scores on the Graduate Record Examination (GRE), with acceptable performance in the Verbal and Quantitative sections.
- Written and spoken proficiency in English.

The applicant must, in addition, have attained such a scholastic record and present such confidential recommendations as to indicate that he or she is well qualified to pursue, with distinction, advanced study and research. In accordance with applicable deadlines, the applicant must submit:

- The appropriate application forms;
- Transcripts of all post-secondary coursework;
- Three letters of recommendation from current or former professors, supervisors, or other appropriate persons;
- A statement of purpose, explaining their interest in the program;
- Results of the GRE;
- Results of TOEFL for international students.

Program Planning

Upon admittance, each student will be assigned a Faculty Mentor from either institution. The mentors will be initially appointed by the Program Coordinators. After one year of study with favorable progress, the student will select a Doctoral
Advisor (from either CGU or KGI) and at least two other persons, one from each campus, to serve on a three-person Doctoral Committee.

During the first year, and before the student selects his/her Doctoral Advisor, the student is strongly encouraged to carry out short-term research work with a number of faculty participants in the program. These short-term projects will comprise the optional “research rotation” component of the program.

The selection of the Doctoral Advisor and the Doctoral Committee must be approved by the two Program Coordinators and by the CGU Dean of Mathematical Sciences and the KGI Dean of Faculty. Additional Doctoral Committee members may include scientists from an outside institution, such as a national laboratory, industry or another accredited university. The Doctoral Committee will then function as the student’s official advising unit. The members of this committee will develop a suitable course of study in consultation with the student, administer the Qualifying Exam, monitor research progress, and administer the student’s Final Exam. Any member of the Doctoral Committee, including the Faculty Mentor and Doctoral Advisor, may be replaced if requested by either the student or the member, and with agreement of the appropriate Program Coordinator and the Deans.

**Good Academic Standing**

A student enrolled in the program must maintain a cumulative Grade Point Average (GPA) of at least 3.0 (B-level) to stay in good academic standing. Failure to maintain the required GPA may result in academic probation for a semester followed by termination from the program if the student fails to bring his/her GPA up to an acceptable level.

**Student Support**

Students will be supported in the first year of study from research grants, traineeships and institutional scholarships. Every attempt will be made to support all students through tuition waivers and living stipends. It is expected that students beyond the first year of study who are associated with a faculty research group will have stipends and tuition supported from research grants.

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**B. Coursework**

The program consists of a minimum of 72 units of coursework. Since the unit accounting system is different at each institution, a full KGI course will count as 4 units for this purpose, and half KGI courses will count as 2 units. These 72 units must be distributed as follows:

- Minimum 24 units of graduate level coursework at CGU Math.
- Minimum 24 units of graduate level coursework at KGI.
- Minimum 24 total units of Research, Independent Study, Dissertation and Graduate Seminar at either institution.

Alternatively, transfer credits of up to 24 units of related graduate-level courses are permissible on approval of the Dean of the CGU School of Mathematical Sciences and the CGU Registrar; this course work must have been completed with at least a grade of B or its equivalent. Certain CGU Botany and Information Science courses may count toward KGI’s course requirements with permission as well.

In addition to the above courses, students are required to participate in the KGI Computational Biology Seminar Series, whose aim is to nurture a vision for the big questions in computational biology today. Students will present and discuss at least one original paper selected by the computational biology faculty every semester and will participate in the presentations of other students. It is obligatory for a student to participate in this seminar series throughout his/her tenure at KGI.

Students should check the schedule of classes at both institutions each semester to come up with a suitable list of courses. Class schedules and course descriptions are accessible on each institution’s website: www.cgu.edu/math and www.kgi.edu/prospective/mbscurriculum.shtml.
C. Research

Qualifying Examination
The student is expected to pass the Qualifying Exam within 2 years of admittance. This examination shall consist of a term research project supervised by a Faculty Mentor, with joint approval from both Faculty Mentors. The student will be required to prepare a written account of research work performed and its results, and offer an oral presentation before the members of the Doctoral Committee. If the student fails all or part of this Qualifying Exam, he/she may request to address the committee’s concerns a second time. The student will normally be terminated from the program upon failure to pass the Qualifying Exam on a second attempt.

Doctoral Research
Dissertation research will be carried out at either CGU or KGI, or at an industry or national laboratory under the supervision of the program faculty.

Dissertation Proposal and Advancement to Candidacy
The student is expected to submit a Dissertation Proposal to the Doctoral Committee no later than upon completion of the student’s third academic year in the program. The Proposal should take the form of a scientific grant proposal to a major funding agency. It should describe the research project that the student intends to carry out on which his/her Doctoral Dissertation will be based. The student must also offer an oral presentation of the Proposal before the Doctoral Committee. Upon successful completion of this presentation, the student will be recommended for Advancement to Candidacy for the Doctoral Degree.

D. Important Milestones

Semester prior to admittance
Student prepares formal application along with supporting documents as outlined in the Admission Requirements section. Application is submitted to CGU. All questions about the status of the application should be addressed to the Program Coordinators.

The coordinators will direct the queries to appropriate administrative units at CGU or KGI, if necessary.

Beginning of Semester 1
Student meets with Program Coordinators who then assign Faculty Mentors to monitor and advise the student. Student selects appropriate courses at CGU/KGI in consultation with the Faculty Mentors and begins coursework. At this time, the student also petitions the Program Coordinators for transfer of appropriate credits from previous institutions, if applicable. The student is strongly encouraged to take part in a “research rotation” before selecting his/her doctoral advisor. International students must provide proof of full-time registration in order to maintain legal immigration status.

By end of Year 1
Student selects Doctoral Advisor and at least two other persons, one from each institution to serve on a three-member Doctoral Committee. The appropriate form must be filed at CGU.

By end of Year 2
Student passes Qualifying Exam consisting of term research project supervised by Faculty Mentor/Doctoral Advisor. The Doctoral Committee will sign the appropriate CGU form stating that the student has passed the Qualifying Exam.

By end of Year 3
Dissertation Proposal submitted to Doctoral Committee. Successful oral presentation of the proposal results in Advancement to Candidacy. The appropriate form for Advancement to Candidacy must be filed at CGU.

By end of Year 5
Final Doctoral Dissertation submitted to Doctoral Committee at least 3 weeks prior to date of Oral Defense. The student is responsible for arranging a suitable Oral Defense date with
members of his/her Doctoral Committee.

**After Year 5**
The Doctoral committee will evaluate the student's progress every six months.

### E. Program Policies

1. Throughout the entire program of study, students taking courses for credit must be registered at CGU. Students who intend not to take course units at either institution, including those who have finished their course units, must take the necessary steps to maintain continuous enrollment. **This is achieved by registering for M499 Doctoral Study at Claremont Graduate University or for ALS 493-494 at KGI.**

2. Requests for leaves of absence must be submitted to the Registrar's Offices at both institutions and approved by both institutions according to the standards of each (available at each institution's Registrar's office). Upon approval of leave, the student must advise KGI and the School of Mathematical Sciences at CGU or risk being dropped from the program.

3. International students registered for units at KGI must provide the CGU International Student Advisor with proof of registration within two weeks of the beginning of the semester at CGU. Proof of full-time registration is required to maintain immigration status.

4. Students should arrange for Faculty Mentors, one in Mathematical Sciences at CGU and one in KGI, at the earliest opportunity. The program coordinators will help provide Faculty Mentors.

5. After consultation with their mentors, students must submit a plan of study, including a petition for transfer of credits, if applicable, during their first year of study. The plan of study must be approved and transfer of units recommended to the Registrar by the Program Coordinators.

6. Students admitted to provisional status must provide the materials needed to complete their files before the end of their first semester of enrollment. Official scores for the GRE General Test are required of all students before admission to full graduate standing. The admissions committee will review completed files for change of status.

7. The academic progress of students admitted to conditional status will be reviewed by the admissions committee prior to a decision about change of status.
Contact Information

Program Coordinators
Professor Ali Nadim (CGU program coordinator)
CGU Office: School of Mathematical Sciences North,
736 N. College Avenue.
Tel: 909-607-9413, Email: ali.nadim@cgu.edu

KGI Office: 517 Watson Drive.
Tel: 909-607-9650
Email: Ali_Nadim@kgi.edu

Professor Brian Aufderheide (KGI program coordinator)
517 Watson Drive.
Tel: 909-607-0398
Email: Brian_Aufderheide@kgi.edu

Contact for CGU Registration,
Forms and Filing Deadlines
Susan Townzen, Program Coordinator
School of Mathematical Sciences South
710 N. College Avenue.
Tel: 909-621-8080
Email: susan.n.townzen@cgu.edu

Contact for KGI Registration
and International Student Advising
Eva Peters, Registrar and International Student Advisor
KGI Office of Student Services
535 Watson Drive.
Tel: 909-607-9649
Email: Eva_Peters@kgi.edu