

**INFORMATICS AND MODELLING CERTIFICATE PROGRAM  
APPROVED PROGRAM OF STUDY**

Last Name: \_\_\_\_\_ First Name: \_\_\_\_\_ M.I. \_\_\_\_\_

Social Security Number: \_\_\_\_\_ WESID#: \_\_\_\_\_ MAJOR: \_\_\_\_\_

Class: \_\_\_\_\_ Adviser(s): \_\_\_\_\_

**COURSES TO BE USED TO COMPLETE THE CERTIFICATE PROGRAM**

**Pathway:**

**Computational Science and Quantitative World Modeling (CSM) \_\_\_\_\_**

**Integrative Genomic Sciences (IGS) \_\_\_\_\_**

DEPT & CID	Course Title	Yr & Sem	Credit

**The satisfactory completion of all courses listed above fulfills requirements for the Informatics and Modelling Certificate Program.**

**Summary: CSM Pathway**

- 1. Introduction to Computer Science (COMP 211)**
- 2. One of the following courses:**
  - COMP 212 (Data Structures)
  - COMP 231 (Computer Structure and Operation)
  - COMP 312 (Algorithms)
  - PHYS 238 (Introduction to Computational Physics)
- 3. Two courses from a menu of specialized courses**  
(see list of courses below)
- 4. Project and Mini-thesis on Quantitative modeling theme**  
(including a required seminar talk)
- 5. Attendance at undergraduate seminar**  
(one semester)

### Sample Courses for Requirement 3

Topic	Course Number
Physical Chemistry IV: Quantum Chemistry	CHEM 340
Molecular Dynamics and Molecular Modeling	CHEM 388
Formal Languages and Automata	COMP 301
Macroeconomics for a Complex World	ECON 345
Mathematical Economics	ECON 380
Econometrics	ECON 385
Microeconomics Research Seminar	ECON 391
Modeling Biochemical and Biological Systems	MB&B 280
Computational Neuroscience and Biophysics	PHYS 333

### Summary: IGS Pathway:

- An introductory biology course**  
(i.e. BIOL/MBB 181 - Principles of Biology I, or an approved alternative)
- One introductory computer science course**  
(for example, COMP 112 - introduction to programming, COMP 211 - Computer Science I, COMP 212 - Data Structures, or approved alternatives)
- An upper-level computer science course**  
(for example, COMP 231 - Computer Science and Operation, COMP 312 - Algorithms and Complexity, COMP 354 - Principles of Databases, or an approved alternative)
- An upper-level bioinformatics course**  
(see table below for approved courses)
- One course in each of two of the following categories** (see table below)  

Molecular Genetics	Structural Biology
Evolutionary Biology	Bioethics & Philosophy of Biology

### Approved Courses for Requirements 4 and 5

Category	Topic	Course Number
<i>Bioinformatics</i>	Bioinformatics and Functional Genomics	COMP/BIOL/MB&B 350/550
	Evolutionary and Ecological Informatics	BIOL/COMP 327
	Bioinformatics: Genomics and Proteomics	CHEM/MB&B 389
	The Genomics of Evolution, Adaptation, & Regulation	MB&B 331/531
<i>Molecular Genetics</i>	Molecular Biology	MB&B 208
	Genetics and Genomics	BIOL/MB&B 210
	Advanced Lab in Molecular Biology and Genetics	MB&B 294
	Molecular Biology of the Chromosome	MB&B 234
	Genes in Development	BIOL 315/515
	Laboratory in Developmental Genetics	BIOL 294
	Gene Regulation	MB&B 333
<i>Evolutionary Biology</i>	Evolution	BIOL 214
	Origins of Bacterial Diversity	BIOL 337/537
	Pattern and Process in Macroevolution	BIOL 369
<i>Structural Biology</i>	Structural Biology Laboratory	MB&B 395
	Introduction to Biomolecular Structure	MB&B 245
	Molecular Dynamics and Molecular Modeling	CHEM 388
	Biological Molecules	CHEM 301
<i>Bioethics &amp; Philosophy of Biology</i>	Reproduction in the 21st Century	BIOL 118
	Unifying Life Sciences: Biological Cultures and Meanings of Life	PHIL 361
	Philosophy of Science	SISP 202
	Human cloning	BIOL 108
	Ethics and the Human Genome	PHIL 279
	Issues in the Health Sciences	BIOL 222