

# **The MS Program in Systems Science as currently being offered by the Computer Science Department at LSU**

(To be effective in the Fall 2010)

The Master's in Science program at the Computer Science Department at LSU is a versatile and innovative program that offers a wide range of opportunities to students. It is called MS in Systems Science and is the MS program offered by the Computer Science Department at LSU. This program was initially created more than 30 years ago but was updated recently in order to meet new challenges in all areas of modern Computer Science.

This MS program, with its various concentrations and options, aims at giving students all the educational, training and research skills and experiences they need to be successful in the many fascinating computer oriented jobs that exist today. It also can serve as a stepping stone towards pursuing doctoral studies in computer science or related fields. With each flexible concentration areas and options, students coming from a wide spectrum of disciplines can pursue it. Examples are from any engineering field, business fields, sciences or even arts and humanities. The above are just indicative.

It is divided into two major concentration areas (on Computer Science and on Computational Science as described next) and also allows for a non concentration variant. The following sections provide details on all the above. Please note that the core courses mentioned in this document, they are the ones listed in the Computer Science's Website with URL: <http://csc.lsu.edu/grad.html#core>

## **Concentration #1: On Computer Science**

### **Option 1: With Thesis**

Under this concentration and option students need to take 8 courses in 2 categories. Category #1 is the Core Courses and they need to take 4 courses. This is the same as in the current situation. Category #2 is the Specialization Area and they need to take 4 courses.

At least 7 of these courses will have to be from the Computer Science Department.

### **Option 2: Without Thesis but with a Project.**

Students need to take 10 courses in 2 categories. Category #1 is the Core Courses and they need to take 5 courses. Category #2 is the Specialization Area and they need to take 5 courses.

At least 8 of these courses will have to be from the Computer Science Department.

For either option, at least half of them will have to be at the 7000 level. No individual study course will be allowed to count in the course requirements. The prerequisites are described in Table 1.

## **Concentration #2: On Computational Science**

Computational science is a fairly recent discipline that has come to the forefront of scientific research and problem solving as a result of the advent of high performance computing. It offers a great interface between traditional computer science and many application areas such as bioinformatics, weather prediction, medical applications, engineering applications, applications in humanities, just to name a few. The domain of applications increases almost continuously.

**Option 1: With Thesis**

Under this concentration and option students need to take 8 courses in 2 categories. Category #1 is the Core Courses and they need to take 4 courses. This is the same as in the current situation. Category #2 is the Specialization Area and they need to take 4 courses.

At least 4 of these courses will have to be from the Computer Science Department.

**Option 2: Without Thesis but with a Project.**

Students need to take 10 courses in 2 categories. Category #1 is the Core Courses and they need to take 5 courses. Category #2 is the Specialization Area and they need to take 5 courses.

At least 5 of these courses will have to be from the Computer Science Department.

For either option, at least half of the courses will have to be at the 7000 level. No special course (individual study course) will be allowed to count in the course requirements. Courses under the Specialization Area have to be related to Computational Science. Please see Table 2 for examples of such courses from other Departments.

**The Non Concentration (i.e., General) Variant**

The “Non Concentration Version” option primarily serves students with non computer oriented background but who are committed in acquiring one as part of this program.

**Option 1: With Thesis**

Students need to take 8 courses in 2 categories. Category #1 is the Core Courses and they need to take 4 courses. This is the same as in the current situation. Category #2 is the Specialization Area and they need to take 4 courses.

At least 4 of these courses will have to be from the Computer Science Department.

**Option 2: Without Thesis but with a Project.**

Students need to take 10 courses in 2 categories. Category #1 is the Core Courses and they need to take 5 courses. Category #2 is the Specialization Area and they need to take 5 courses.

At least 5 of these courses will have to be from the Computer Science Department.

For either option, at least half of them will have to be at the 7000 level. No individual study course will be allowed to count in the course requirements. The prerequisites are the same as with the existing MS program.

As a general comment, regarding the courses from the Computer Science Department, students may replace one CSC course with a course from another Department at LSU. The CSC course being replaced could be either from the list of Core Courses or the Specialized Area courses. Such courses will have to be approved by the Graduate Advisor and the MS Committee of the student.

Some examples of such courses are the following ones from the ECE Department at LSU:

EE 4700-2 Geometric modeling and computer graphics

EE 7000-2 Graphics and visual computing  
 EE 4760 Introduction to compiler optimizations  
 EE 7785 Compiler optimizations

Regarding the core courses mentioned earlier and also in Table 1, they are the ones listed in the Computer Science’s Website with URL: <http://csc.lsu.edu/grad.html#core>

Regarding the specialization area courses under the various options the following guidelines are applicable. For the non-concentration case, Table 4 has examples of such courses. For the Computer Science concentration case, the student’s MS Committee will determine eligible courses according to the nature of the particular MS student’s plan of study and research interests. For the Computational Science concentration case Table 2 has examples of such courses.

**Table 1.** Summary of the Requirements of the MS in Systems Science program at the Computer Science Department at LSU.

<b>The MS Program in Systems Science at the CS Department at LSU</b>						
	<b>The Non-Concentration (i.e., the General) Option</b>		<b>Concentrations</b>			
			<b>Concentration on Computer Science</b>		<b>Concentration on Computational Science</b>	
	<b>With Thesis</b>	<b>Without Thesis</b>	<b>With Thesis</b>	<b>Without Thesis</b>	<b>With Thesis</b>	<b>Without Thesis</b>
<b>Core Courses</b>	4 courses (12 credits) from at least 2 core groups	5 courses (15 credits) from at least 2 core groups	4 courses (12 credits) from at least 2 core groups	5 courses (15 credits) from at least 2 core groups	4 courses (12 credits) from at least 2 core groups	5 courses (15 credits) from at least 2 core groups
<b>Specialization Area</b>	4 courses (12 credits)	5 courses (15 credits)	4 courses (12 credits)	5 courses (15 credits)	4 courses (12 credits) related to Computational Science	5 courses (15 credits) related to Computational Science
<b>Total Coursework</b>	8 courses (24 credits). At least half of them should be at the graduate level. At least 4 of them must be from the CS Department.	10 courses (30 credits). At least half of them should be at the graduate level. At least 5 of them must be from the CS Department.	8 courses (24 credits). At least half of them should be at the graduate level. At least 7 of them must be from the CS Department.	10 courses (30 credits). At least half of them should be at the graduate level. At least 8 of them must be from the CS Department.	8 courses (24 credits). At least half of them should be at the graduate level. At least 4 of them must be from the CS Department.	10 courses (30 credits). At least half of them should be at the graduate level. At least 5 of them must be from the CS Department.
<b>Thesis/Project</b>	Thesis CSC 8000: 12 credits	Project CSC 7090: 6 credits	Thesis CSC 8000: 12 credits	Project CSC 7090: 6 credits	Thesis CSC 8000: 12 credits. It has to be Computational Science oriented.	Project CSC 7090: 6 credits. It has to be Computational Science oriented.
<b>Prerequisites</b>	Same as current ones (i.e., under the current MS program in Systems Science)					

**Table 2.** Some Examples of non Computer Science Department Courses for the Computational Science Concentration.

CE 7700 Special Topic: Applied Coastal Modeling
CE 7275 Groundwater Modeling
CE 4450 Finite Element Methods (for structural analysis)
ChE 7700 Special Topic: Introduction to Molecular Simulation of Soft Matter
ChE 7700 Special Topic: Numerical Solution of Engineering Problems
CHEM 4581 Introduction to Mathematical Chemistry
DOCS 7028 Numerical modeling of ocean circulation
EE 4450 Distributed System Design
EE 4700 Parallel Programming
EE 4700 Geometrical Modeling and Computer Graphics
EE 4702 GPU Programming
EE 7000 Software Optimization for Multicore
EXST 7142 Data Mining
ISDS 7230 Project Management
PETE 7290 Mathematical Simulation of Petroleum Reservoir Performance
PETE 7285 Statistical Reservoir Modeling
ME 4823 Interdisciplinary Fluid Dynamics: Computational Methods
ME 7813 Computation of Boundary Layer Flows and Heat Transfer
ME 7823 Computation of Fluid Flow and Heat Transfer
PHYS 7411 Computational Physics: Computing for Petascale Systems

**Table 3.** Some Examples of non Computer Science Department Courses for the Specialization Area Under the Non-Concentration Option.

EE 7000 Computer Graphics
EE 7526 Robust Control
EE 7674 Wireless Com. Networks
EXST 7031 Experimental Design
EXST 7036 Categorical Data Analysis
EXST 7061 Statistical Theory
ISDS 7230 Project Management
ISDS 7510 Database Management
ISDS 7520 Network Info Systems I
MATH 4171 Theory of Graphs
MATH 7400 Combinatorial Theory
MATH 7510 Topology I