Curriculum Committee
Minutes

October 17, 2005

Attendees: Tom Doeppner, Chad Jenkins, Franco Preparata, John Savage (Chair)
Absent: Claire Kenyon, Steve Reiss
Guest: Anna Lysyanskaya

1. Approval of Today’s Agenda

   The proposed agenda was approved.

2. Approval of Minutes of October 3

   In the course of reviewing the minutes of the last meeting, we reviewed the web page produced by Tom Doeppner of Brown CS courses organized by area, as defined in our undergraduate concentrations requirements. In reviewing the list of courses we identified a number of issues that need addressing, as shown below.

   (a) We could not determine why the adjective “practical” is used in the name of CS178. Steve Reiss will be approached for a response to our question.

   (b) We decided to delete CS195-5 from the list of AI courses since it was last taught by Thomas Hofmann who has now left us. (It has been removed from the web site.)

   (c) We observed that CS295-9, Stochastic Optimization appears to be offered reasonably frequently. Eli Upfal will be approached about the possibility of his having it approved as a regular course.

   (d) We observed that CS295-9, Stochastic Optimization, and CS296-9, Advanced Probabilistic Methods in Computer Science appear to have been offered reasonably frequently. Eli Upfal will be approached about the possibility of his having them approved as a regular course.
(e) CS 166, *Introduction to Computer Systems Security*, was listed as a theory course. It needs to be moved to the Software Systems category. (Done.)

(f) CS 295-4, *Approximation Algorithms*, is being taught for the second time. Claire will be asked to submit it for approval as a regular course.

(g) There are other special topics courses that are likely to be taught multiple times but that are being taught for the first time during this academic year. The instructors will be encouraged the second time around to have them approved as regular courses.

After this discussion the minutes of were approved.

3. Approval of Introduction to Combinatorial Optimization

We reviewed Meinolf Sellman’s course proposal and have the following observations:

(a) The prerequisites for the courses should be modified to say that either Math 52 or Math 54, the honors section of Math 52, are required.

(b) The item under course description referring to “Credit” should be deleted because it is relates only to a departmental classification.

(c) Committee members would like to know what overlap exists between this course and course offered either in CS or in the Division of Applied Mathematics. We are quite sure that this type of question will be raised by the CCC.

(d) The Committee chair will inform the Brown library that this course will be offered on a regular basis. Meinolf reports that library need not make any special purchases must be made in connection with his course.

4. Comparison of Computing Curricula 2001 courses and our courses

The committee then compared our departmental courses and the courses identified in the ACM/IEEE Computer Society study *Computing Curricula 2001*. The courses are summarized in Figure A-1 on page 85 of the document. Subsequent pages provide detail on each course.

(a) DS. Discrete Structures

Franco reported that our course CS022 covers all the core material in DS and more. This was confirmed by Anna.
(b) AL. Algorithms and Complexity
Franco also compared the content of AL with our courses CS016, CS017-018, and CS051. He reports that these core courses cover all the core material in sections AL1-AL7. The material in AL8, AL9, and AL11 is covered at the 100 level while the material in AL10 is taught at the graduate level.

(c) AR. Architecture and Organization
Franco and Tom reported that all the core material in this area is covered by our core courses except for material in AR5 and AR7. The former covers multimedia support and RAID, topics that Tom considers a bit out of date. (The CC2001 report was written in 2001.) We do teach the material in AR7 but not in our core. We consider it somewhat dated. Material in AR8 and AR9 are covered at the 100 level. AR9 is covered in our network course.

(d) OS. Operating Systems
Tom’s report follows.

We cover everything in their rather minimal core in CS167, an elective.
OS1: Overview of operating systems
OS2: Operating systems principles
OS3: Concurrency
OS4: Scheduling and Dispatch
OS5: Memory management

We also cover two electives completely:
OS7: Security and Protection
OS8: File Systems

We cover bits and pieces of two electives:
OS6: Device Management
OS9: Real-time and embedded systems

We cover the following topics in CS167 course that aren’t mentioned in the report:

Distributed computing:
  Introduction to TCP/IP
  RPC protocols
  Distributed file systems

(e) NC. Net Centric Computing
Tom’s report follows.

In CS168 we cover the first three (of four) topics from their extremely minimal core:

NC1: Introduction to net-centric computing
NC2: Communication and networking (they suggest a minimum of 7 hours for this; it’s half our course)
NC3: Network Security

We don’t cover their core topic NC4 (The web as an example of client-server computing).

We cover bits and pieces of the following elective areas:
NC6: Network Management
NC7: Compression and decompression
NC9: Wireless and mobile computing

What we cover that doesn’t seem to be on their list is Quality of Service, including integrated services and differentiated services.

(f) GV. Graphics and Visual Programming
Chad’s report follows.

It is apparent that Brown is provides an abundance of training for preparing students in computer graphics.

Courses
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cs24 Visual Thinking/Visual Computing (van Dam)
cs123 Introduction to Computer Graphics (van Dam)
cs125 Introduction to Computer Animation (Meier)
cs137 Virtual Reality Design for Science (empty, Laidlaw)
cs143 Introduction to Computer Vision (Black)
cs196-2 Innovating Game Development (Jenkins)
cs224 Interactive Computer Graphics (Hughes)
cs231 Human Factors & User Interface Design (empty)
cs237 Interdisciplinary Scientific Visualization (Laidlaw)
cs252 Computational Geometry (empty)

GV Core
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This view of Intelligent Systems is slightly antiquated and biased towards a traditional planning-based viewpoint. I would consider computer vision to be more pertinent to intelligent systems than computer graphics. Despite these
concerns, Brown students are well served in Intelligent Systems.

Courses
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cs141 Introduction to Artificial Intelligence (Sellmann)
cs143 Introduction to Computer Vision (Black)
cs146 Introduction to Computational Linguistics (Johnson, Cognitive Science 136)
cs148 Building Intelligent Robots (Jenkins)
cs195-3 Introduction To Combinatorial Optimization (Sellmann)
cs195-5 Intro. to Machine Learning (empty, Griffiths placeholder)
cs196-2 Innovating Game Development (Jenkins)
cs241 Statistical Models in Natural Language Understanding (Charniak)
cs242 Artificial Intelligence (empty)
cs243 Topics in Machine Learning (empty, Hofmann previously)
cs258 Solving Hard Problems in Comb’l Opt’n: Theory & Systems (Van Hentenryck)
cs295-3 Topics in Machine Learning & Data Mining (empty)
cs295-3 Topics in Machine Vision and Learning (empty, Black?)
cs295-5 Topics in Game-Theoretic Artificial Intelligence (empty, Greenwald?)
cs295-7 Topics in Brain-Computer Interfaces (empty, Black?)

Potentially applicable courses
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cs41?
cs155 Probabilistic Methods in Computer Science
cs185 Information Theory (Applied Math 171)
cs295-1 Sensor Data Management
cs296-6 Advanced Probabilistic Methods in Computer Science
cs295-9 Stochastic Optimization (empty)

Core
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IS1 Fundamental issues in intelligent systems
cs141 Introduction to Artificial Intelligence (Sellmann)

IS2 Search and constraint satisfaction
cs141 Introduction to Artificial Intelligence (Sellmann)
cs195-3 Introduction To Combinatorial Optimization (Sellmann)

IS3 Knowledge representation and reasoning
cs141 Introduction to Artificial Intelligence (Sellmann)
Elective
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IS4 Advanced search
cs141 Introduction to Artificial Intelligence (Sellmann)
cs195-3 Introduction To Combinatorial Optimization (Sellmann)
cs258 Solving Hard Problems in Comb’l Opt’n: Theory & Systems (Van Hentenryck)

IS5 Advanced knowledge representation and reasoning
All of the AI courses appear to address some part of these issues from different application-oriented perspectives

IS6 Agents
cs141 Introduction to Artificial Intelligence (Sellmann)
cs295-5 Topics in Game-Theoretic Artificial Intelligence (empty, Greenwald?)

IS7 Natural language processing
cs146 Introduction to Computational Linguistics (Johnson, Cognitive Science 136)
cs241 Statistical Models in Natural Language Understanding (Charniak)

IS8 Machine learning and neural networks
cs195-5 Intro. to Machine Learning (empty, Griffiths placeholder)
cs243 Topics in Machine Learning (empty, Hofmann previously)
cs295-3 Topics in Machine Learning & Data Mining (empty)
cs295-3 Topics in Machine Vision and Learning (empty, Black?)

IS9 AI planning systems
cs148 Building Intelligent Robots (Jenkins)

IS10 Robotics
cs148 Building Intelligent Robots (Jenkins)

(h) CN Computational Science
John reported that except for linear programming under CN2, none of the material on this topic is taught in CS. However, in Applied Mathematics courses on numerical analysis (AM 117), operations research (AM 120 and 121), modeling and simulation, and high performance computing are offered (AM 194).