# School of Computer Science

# Scheduling Booklet

# Class of 2010
# Fall 2006

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[1] The format of this document has been adapted from the Mellon College of Science Freshman Packet prepared by Eric Grotzinger, Freshman Advisor and Associate Dean, MCS and his assistant, Katya Malkin. Jim Roberts, the original SCS Freshman Advisor, added the material that is specific to SCS. Rich Pattis, the current advisor has updated it.

Thanks to the members of the freshmen class of 2001, 2002, and 2003 for reviewing this material and suggesting changes.

# I.  Introduction and Overview of the Process

This document will explain some of the ins and outs of registering for your fall courses. It assumes that you have read the **Facts of Life and Frequently Asked Questions** document. If you have not read that document, please read it immediately –and read it carefully. There is much to learn about college and that learning begins now. I guess the first thing you'll learn is that college involves lots of reading.

As an incoming SCS freshman, you will begin registering for your fall courses over the summer; most students won't finish this process until after they arrive at CMU. Before registering, you must (1) read lots of documents, (2) fill out lots of forms, and (3) send me your AP/IB/Cambridge (or transfer) credit. Most students will complete the first two items by the middle of July, and will send me their AP scores by the end of July (which is typically when ETS distributes them). Once I have all your materials, I will remove the "hold" on your registration, and you will begin registering, using OLR (CMU's On-Line Registration system), aided by either CMU's Pulse Scheduler or Tartan's Schedule Man: both of these systems automate much of the pain of laying out a complicated schedule and finding substitute courses (if a course you want to take is filled).  You'll be advised to practice with these systems in a subsequent document. Help will be available throughout the summer for all registration issues.

It will benefit you to read the documents, fill out the forms, and get me your AP/IB/Cambridge (or transfer) credit as soon as possible: the sooner you do this, the sooner you can register, and the sooner you register, the more likely it is that you will get most of the classes that you want. Last year over 80% of the students got all the courses they wanted; and, almost everyone who didn't was able to get their first alternative choice.

There is a lot of material here, and you need to become familiar with all of it. You will take approximately 40 courses as a CS major, to earn your degree. About 1/3 of those courses are required. You choose the remaining 2/3 from various lists of courses. You will make some of those choices this summer. Much of what follows in this document provides the background information that you need to know to start thinking about making these choices.

Do all the work yourself. This is your job. Getting advice from parents or siblings in college is a good idea, but you should read all the documents and fill out all the forms by yourself. All the readings are on the web and you will fill out all the forms online. See the **Registration Instructions and Checklist** for the order in which to read the documents and fill out the forms. Hint: you should read all the documents first, so you'll know which ones contain material relevant for filling out the forms. I advise printing all the documents, and then underling the sections that are relevant to you.


# II. Dictionary of Acronyms and Terms

The following acronyms and terms are used throughout this document, the college catalog, and the class schedule.

| | |
|---|---|
| AP | Advanced Placement (program or exam; like IB, but primarily for US students) |
| AFS | Andrew File System (where you store information, managed and backed up by CMU) |
| Andrew | The distributed computer system that we use on campus – you already have an Andrew account |
| AndrewID | This is NOT your student number –it is the name (sequence of letters and digits) that you enter to log into your Andrew account; it appears right before you enter your password. My AndrewID is **pattis**. Your AndrewID and password is your passport to all sorts of websites restricted to CMU students |
| CSW | Computing Skills Workshop (a mini-course that SCS requires our freshmen to take in the fall) |
| GPA | Grade Point Average (also known as Quality Point Average: QPA); course grades weighted by course units |
| HUB | The "one-stop" place for all registration and enrollment concerns located in the basement of Warner Hall, which serves as your interface to the university. Online, see http://www.cmu.edu/hub |
| IB | International Baccalaureate (program or exam; like AP, but primarily for foreign students) |
| IC | The Freshman Immigration Course (a course that SCS requires our freshmen to take in the fall; do not confuse it with the Immigration Course for 1st year Graduate students) |
| ID Number, Student ID Number, Student Number: | All of these refer to what is usually your Social Security Number; some students (such as those with no SS number) may have special CMU issued ID numbers. |
| Mini-course | A course that lasts for only half a semester. CSW is a mini-course that you must take in the fall |
| OC | Orientation Counselor: your leader during freshman Orientation Week |
| OLR | On-Line Registration: a system you will use to register for courses during summer and Orientation Week |
| R | On a Schedule: Thursday (Tuesday is abbreviated by T). On a report card: indicates a failing grade (originally R stood for "repeat") |
| RA | Resident Assistant: an upperclassman who helps supervise a dorm floor |

## Colleges within the University

The university is divided into various academic colleges and research units. The following are the 7 colleges within CMU and some of the majors they host:

CFA          College of Fine Arts (Architecture, Art, Design, Drama, and Music degrees)
CIT           Carnegie Institute of Technology (Biomedical, Chemical, Civil, Electrical, Mechanical engineering degrees)
H&SS       Humanities and Social Sciences (Economics, English, History, Information Science, Modern Languages, Philosophy, Social and Decision Sciences, and Statistics degrees)
Heinz       H. John Heinz III School of Public Management (no undergraduate degrees)
MCS       Mellon College of Science (Biology, Chemistry, Math, and Physics degrees)
SCS        School of Computer Science (CS degree only)
SIA         The Tepper School of Business, formerly the School of Industrial Administration (Business Administration)

Within SCS, the only department that offers an undergraduate degree is the Computer Science Department (CSD). I use SCS, CS, and CSD interchangeably when I am talking about undergraduate courses or students. Other departments in SCS offer undergraduate minors or graduate degrees.

## Course Numbers

The first two digits in a course number are its department identifier: e.g., 15 is computer science; 21 is math; 33 is physics. The last three digits are the course identifier. While there is no absolute rule, 100 level courses are generally for freshman, 200 level courses are generally for sophomores, etc. I advise freshman not to take a course that is numbered at or above the middle 200s without first talking to me and the faculty member who is teaching the course. Here are some course numbers:

| Department | Course Number | Course Name |
| --- | --- | --- |
| Art | 60-011 | Art Elective |
| Biology | 03-121 | Modern Biology |
| Chemistry | 09-105 | Introduction to Modern Chemistry 1 |
| Computer Science | 15-200 | Advanced Programming/Practicum |
| Economics | 73-100 | Principles of Economics |
| English | 76-101 | Interpretation and Argument |
| History | 79-104 | World History |
| Math | 21-127 | Concepts of Mathematics |
| Modern Languages | 82-201 | Intermediate French 1 |
| Music | 57-002 | Music Elective |
| Physics | 33-111 | Physics for Science Students 1 |
| Psychology | 85-100 | Introduction to Intelligence, in Humans, Animals, and Machines |
| Statistics | 36-217 | Probability Theory and Random Processes |

## Units

Each course carries a certain number of "units". You must pass courses worth at least 360 units to graduate. Your AP/IB/Cambridge (and transfer) credits will count toward this total. What is a unit? Units are a measure of the amount of work that is required by a course each week, in and out of class. Most courses are 9 or 12 units. For example, a 9 unit course will require about 9 hours of work each week. To be a full time student at CMU, you must carry a minimum of 36 units each semester. If a schedule contains more than 57 units, it is considered to be "overloaded". First semester freshman may not overload their schedules. I recommended a load of 45 – 55 units for a first semester CS freshmen: on average, most carry about 49 units.

If you earn a GPA of 3.00 or higher in a semester, you may overload your schedule (up to 69 units) during the following semester. If you earn a GPA lower than 3.00 in a semester, you may not overload your schedule during the following semester. Note that the limit for a subsequent semester does not change until **after** the prior semester grades are posted. Thus, you cannot register for a course that overloads your schedule until after your grades for the prior semester are posted. This is a bit confusing. We will discuss it more during the IC at the end of the fall semester (if you don't remember what IC stands for, look it up).

## Lectures, Sections, and Recitations.

Courses that meet both in Lecture and Recitation have a Lecture **number** and Section **letter**. For such courses, the lectures correspond to one large group meeting and the sections correspond to recitations that are much smaller. Please note that you are required to attend all course meetings –it is not a case of pick and choose between Monday/Wednesday/Friday or Tuesday/Thursday. Some courses meet just in Sections (again, specified by a letter); there is no lecture for these courses. See section XV *Hints for Reading the Schedule of Classes*, for more pragmatic information on this topic.

**Mini-courses**

Mini-courses run for half a semester –about 7 weeks. All of you will take at least one mini-course in the fall, CSW.  The university has four mini-course terms, numbered 1 through 4:
- mini-1 meets the first half of the fall semester
- mini-2 meets the last half of the fall semester
- mini-3 meets the first half of the spring semester
- mini-4 meets the last half of the spring semester.

The sections of most full semester courses are identified by a single letter of the alphabet:

    15-200 A

Mini courses are different. They use a letter followed by a number. The letter is similar to a section letter, while the number (always last) identifies the mini-term in which the course is taught. So,

    99-101 A1 is a mini-course that meets during the first half of the fall semester

    99-102 A2 is a mini-course that meets during the last half of the fall semester.

    15-113 F3 is a mini-course that meets during the first half of the spring semester

    15-113 C4 is a mini course that meets during the last half of the spring semester.

I recommend taking mini-courses during the **first half** of the semester. These finish at mid-semester. Thus, you can study for mini finals by themselves, and they are over before most of your finals occur, at the end of the semester.

# III. Overall Strategy for Building a Schedule

You want to satisfy the following requirements in your first four semesters, or sooner:
- five semesters of math (two Calculus, MatrixAlgebra, Discrete Mathematics, and Probability)
- four science/engineering courses (at least two from the same department), including a lab
- a freshman writing course and a CS Technical writing course
- three humanities breadth requirements

More information about some of these requirements appears later in this document. The strategy to follow in planning your schedule is to satisfy these requirements a soon as possible, and preferably in your first four semesters.  If you have already satisfied some of these requirements, by AP/IB/Cambridge exams, or by transfer credit, or by some other approved means, you should focus on finishing the rest of these requirements.

There are several reasons for using this strategy. These courses are requirements, and the sooner you have them finished, the more flexibility you will have in your schedule. That flexibility in your junior and senior years may allow you to more easily satisfy the requirements for a double major, or take extra electives in an area that interests you. Because these courses are normally taken by freshmen and sophomores, you can get into these courses more easily now. Avoiding these courses until your last four semesters can create a scheduling nightmare for you.

# IV. The Freshman Immigration Course (IC)

You are a member of the thirteenth Computer Science freshman class in this degree program. Every entering CS freshman in the previous years has taken 15-128, the Freshman Immigration Course, and you will too. There have been no exceptions. Sophomores who transfer into CS after their freshman year still must take this course during their first year here. You will take this course and take it as a first semester freshman. The course meets on Tuesday afternoons from 3:00 to 4:20 in Wean Hall 7500. Attendance is mandatory and missing more than three sessions can result in failure for the course. You are not allowed to schedule overlapping courses or conflicts with the Freshman Immigration Course. I will check your schedule and drop you from any course that overlaps or conflicts with the IC.

At each meeting of the IC two events will occur:
- You will meet a different member of the faculty, including the Dean, Department Chair, and the Associate Dean for Education; each will talk about the School or Computer Science, some area in Computer Science, and/or their research.
- You will learn a bit more about the "rules" for being a CS major, and what you must do to graduate.

Each of you has brought a definition of "Computer Science" to CMU. Most of your definitions are probably too narrow; a few are just plain misguided. We want to broaden your definition of Computer Science, and correct it if necessary. This course is a wonderful introduction to the myriad of faculty and research activities at CMU; I learn something new and interesting during every lecture. So, I think you will find this an interesting and informative course on several levels. Plus, it is a time that all SCS freshman can meet and interact. I will often make announcements to all freshmen during this course.

There are small assignments and tasks scattered throughout the semester that go towards a passing grade in the IC, along with your attendance. This course is graded pass/fail and carries a weight of 1 unit.

## V. The Computing Skills Workshop (CSW)

CSW will introduce you to the campus computing environment. This course is required for graduation and you must take it and finish it during the first half of the fall semester (mini-1). This course is not difficult to pass, but it is easy to fail: you must put forth an effort to do the work on time and take the exams when they are scheduled. The best advice I can offer you is to do the work, pass the tests, and satisfy the requirement.

Here is a description of CSW from the director of the program:

> *Computing Skills Workshop (CSW) is a 3-unit required class that ALL incoming undergraduate students take when they arrive on campus. The course is comprised of mostly Carnegie Mellon specific information and helps students understand what resources are available to them and what responsibilities they have as a user in our computing community. Class is held twice/week for 50 min for 1/2 of the semester. There is very little work required outside of class, so students are expected to attend all classes. This course is only offered during the fall and spring semesters. There are no test-out opportunities or summer programs. Advanced Placement Computing Courses cannot be credited/substituted for this requirement.*

The courses are listed under the "Carnegie Mellon University Studies" section of the Course Schedule. The three courses (99-101, 99-102, 99-103) all cover similar content. All sections of 99-101and 99-102 use PCs for instruction; all sections of 99-103 use Macs for instruction. Sign up for courses ending with the digit 1: these meet during the first half of the semester (are 1st half mini-courses). This course carries a weight of 3 units and is graded pass/fail.

No doubt many of you will find much material in this course repetitive. Use your time here to explore more advanced features of the topics discussed (there is still plenty for you to learn).

## VI. The Discrete Mathematics Course (21-127)

Almost all students take Concepts of Mathematics (21-127), unless you perform very well on the On-Line Discrete Mathematics Exam and/or have college level transfer credit for this course, or have taken this course at CMU prior to arriving here this fall. There are no equivalent courses in the AP/IB/Cambridge A Level programs. No matter what your background, you should take the On-Line Discrete Mathematics Exam. If you score very well, you will be excused from taking 21-127 (although some students who are excused still take this course). Because we expect few students to have studied this material systematically, we expect most students to do poorly on this exam. Don't worry.

## VII. The First-Semester Programming Course

All students take one programming course during their fall semester: either 15-100, 15-200, or 15-123 (and in a few rare cases, students may be placed into 15-211, 15-212, or 15-213). See the **First Semester Programming Course Selection** form for a detailed description of these courses, and some advice on which one to schedule. You must fill out this form as well, which includes programming exercised for students who wish to bypass 15-100 and 15-200. Here is some basic advice about your choices.

Schedule 15-100, if you have not had the equivalent of a rigorous, full year programming course in an object-oriented language (Java, C++, Python, Smalltalk, etc). About 25 students typically follow this route.

Schedule 15-200, if you have taken a rigorous, full year programming course in an object-oriented language, exemplified by scoring 3-5 on the AP/CS **A** exam, or 2-4 on the AP/CS **AB** exam, or 6 on the IB exam. About 60 students typically follow this route.

Schedule 15-123, if you have mastered a rigorous, full year programming course in Java, including collection classes, self-referential classes (for implementing lists and trees), recursion, and big-O notation, exemplified by scoring 5 on the AP/CS **AB** CS Exam, or 7 on the IB exam. About 40 students typically follow this route. Note that although 15-123 has only 15-100 as a prerequisite, SCS students are required to take this course after they take 15-200.

Students wishing to schedule a course beyond these three will need to contact me to discuss their placement. There are so few of these students that it is not worthwhile for me to discuss the issue any way, other than one on one.

After receiving all your **First Semester Programming Course Selection** form, I will also advise you as to which course I think is appropriate for you. We have scheduled 15-100 and the lecture for 15-200 to meet on the same day, at the same time. So, it will be easy for you to transfer between these courses during the first few weeks of the semester, if your find that you have scheduled the wrong course (but, easier to move down than to move up). Much more on this soon.

# VIII.  Choosing a Math Course

This section discusses the information about your mathematics requirements (outside of Discrete Mathematics). In addition, you must take the On-Line Calculus Placement Exam.

You are required to take two semesters of Calculus (typically, 21-120 and 21-122) and then one semester of Matrix Algebra (21-241). You are also advised to take Calculus in Three Dimensions (21-259), because it is a prerequisite for some of the more popular CS electives (mostly robotics and graphics courses). If you have AP/IB/Cambridge (or transfer) credit for Calculus I and II, and do well on the On-Line Calculus Placement Test, you should consider taking either 21-241 or 21-259 in the fall.

Calculus I  (21-120) is named "Differential and Integral Calculus" at CMU.
Calculus II (21-122) is named "Integration, Differential Equations, and Approximation" at CMU

There is another variation of these two courses, for students with a limited Calculus background: Integration and Differential Equations (21-121) is the last half of Calculus I and first half of Calculus II; Calculus of Approximation (21-123) is a mini course, which finishes the last half of Calculus II. It is offered only during the first half of a semester. Some students will be advised to take this variant sequence.

By scoring very well on the On-Line Calculus Placement Exam, you might be offered the chance to take 21-121, 21-122 or 21-123 even if you did not take the AP/IB/Cambridge exam. It is also possible that you will be required to take 21-120, 21-121, 21-122, or 21-123 even if you did take the AP/IB/Cambridge exam, if your score poorly on the On-Line Calculus Placement Exam. So, the On-Line Calculus Placement Exam is important. Treat it seriously.

- If you have no AP/IB/Cambridge (or transfer) credit for math, you will most likely register for 21-120 in the fall.

- If you have AP/IB/Cambridge credit via the Calculus AB exam (and you did well on the On-Line Calculus Placement Exam) you will receive credit for 21-120. You will most likely register for 21-122 in the fall.

- If you have AP/IB/Cambridge credit via the Calculus BC exam (and did well on the On-Line Calculus Placement Exam) you will receive credit for 21-120 and 21-122 and will most likely register for Matrix Algebra (21-241) or Calculus in Three Dimensions (21-259).

- If you are considering a minor or double major in Mathematics, or just like it and are good at it, consider taking Analysis I and II (21-131 and 21-132). These courses are by invitation only. If you are interested, list 21-131 on your **Schedule Planning Form** and I will submit your request to the Mathematics Department. Because there are a limited number of seats in this course (about 40), it will help if you fill out your forms early. **Important**: Because this material repeats Calculus I and II (at a much higher level of rigor, with more proofs) students taking these courses will not receive credit for "placing out" of Calculus I and II.

  The objective of this version of calculus is to offer exceptionally well prepared students a more rigorous treatment of the single variable calculus than is possible in a course that attempts to meet the needs of students with a wide range of backgrounds. The content and level of this two semester course goes well beyond that of the usual calculus sequence. Thus, the motivation to master the construction of mathematical proofs is a key pre-requisite. Finally, these courses serve as prerequisites for the Mathematical Studies program. I will be glad to talk to you about this option on campus.

  **21-131 Analysis I  Fall only: 10 units**

  An enriched, first course in calculus which includes a greater concentration on the foundations of the subject. Recommended for students with some prior background in calculus and who seek a deeper calculus course. Functions, limits, continuity; the Intermediate Value Theorem; the Riemann integral; the Fundamental Theorem of Calculus; integrability of continuous functions; the derivative and its significance; product rule, quotient rule, chain rule; Mean Value Theorem; inverse functions. 3 hours lecture, 2 hours recitation.

  **21-132 Analysis II Spring only: 10 units**

  A continuation of Analysis I. L'Hopital's rule; trigonometric, logarithmic, and exponential functions; techniques of integration; approximation by polynomials, Taylor's theorem; sequences, series, power series; introduction to differential equations. 3 hours lecture, 2 hours recitation. Prerequisite: 21-131, or consent of the instructor.

# IX. Choosing a Science/Engineering Course

You are required to complete four science/engineering courses for graduation. Two courses must be from the same department. One of the four must be a laboratory course. Physics Lab (33-104) is a full 9 unit course all by itself and it satisfies the lab requirement. Chemistry Lab (09-101) is only a 3 unit course and must be coupled with Modern Chemistry I (09-105) to satisfy the lab requirement. Most students satisfy their lab requirements in one of these two courses (but there are other ways, including 27-100 and 85-310, and a few more obscure other ones in Biology and Physics. Note that neither 18-100 nor robotics courses satisfy the lab requirement: we are looking mostly looking for science –not engineering– labs). If you have no AP credit, you should schedule one science or engineering course each semester for your first two years at CMU. The typical fall semester choice for a student with no AP credit is one of the following: Modern Biology (03-121), Introduction to Modern Chemistry (09-105) along with Chemistry Lab (09-101), Physics for Science Students I (33-111), or Matter and Interaction I (33-131).

**Information about Physics from the Dean of the Mellon College of Science:**

"When you are completing your Schedule Planning Form, you will see that you have a choice between two introductory physics courses: Physics for Science Students I (33-111), and a more advanced version, Matter and Interactions I (33-131). If you have a strong interest in physics and a good high school preparation in physics, you may wish to register for the more advanced course (33-131), which is more challenging and requires substantially more work, including a significant amount of programming.

Both courses stress the atomic structure of matter, and the connections between microscopic and macroscopic views of phenomena. In addition to treating classical (Newtonian) physics, important themes are the limitations of classical physics and the need for quantum mechanics and relativity. An important emphasis is physical modeling: the prediction and explanation of physical phenomena starting from fundamental principles, making appropriate simplifying assumptions and approximations.

Who should take 33-131 Matter and Interactions I: If you score a 4 on the AP Physics C: Mechanics exam, or 700 or greater on the Physics SAT II exam, we encourage you to take Matter and Interactions I. In addition, if you intend to minor or double major in physics and have a 5 on the AP Physics C: Mechanics exam, we encourage you to take Matter and Interactions I since it will be substantially different than the physics you took in high school. If you receive a 5 on the AP Physics C: Mechanics exam and elect to take Matter and Interactions I, you will forfeit your AP credit."

If you have AP/IB/Cambridge (or transfer) credit for Physics I and do not want to take Physics II this semester, you may want to consider taking 33-224 Stars, Galaxies, and the Universe – a nine unit course. Or, maybe you want to take a different science course to count next toward your requirements. If you do plan to take Physics II, I encourage you to take it earlier rather than later.

If you have AP/IB/Cambridge (or transfer) credit for a particular science course, you will be able to take a course in a different department or the next course in the sequence. Here a list of the science sequences based on prerequisites.

| Area | AP (IB) | Next Course to Take |
|---|---|---|
| Biology | Exam score of 4 (6)<br>Credit for 03-011  Biology Elective | 03-121 Modern Biology |
| | Exam score of 5 (7)<br>Credit for 03-110  General Biology | 03-121 Modern Biology |
| Chemistry | Exam score of 4 (6)<br>Credit for 09-101 Chemistry Lab and<br>  09-105 Modern Chemistry I | 09-106 Modern Chemistry II |
| | Exam score of 5 (7)<br>Credit for 09-101 Chemistry Lab and<br>  09-105 Modern Chemistry I and<br>  09-106 Modern Chemistry II | 09-217 Organic Chemistry |
| Physics | Exam score of 5 (7) on Physics C: Mechanics exam<br>Credit for 33-111 Physics I | 33-112 Physics II<br>or<br>33-224 Stars, Galaxies, Universe |
| | Exam score of 5 (7) on Physics C: E&M exam<br>Credit for 33-112 Physics II | 33-111 Physics I |
| | Exam score of 5 (7) on both Physics C exams<br>Credit for 33-111 Physics 1 and 33-112 Physics II | 33-211 Physics III<br>or<br>33-224 Stars, Galaxies, Universe |

A complete listing of AP/IB/Cambridge Exam by Credit appears on page 10.

# X. Choosing a Humanities /Fine Arts Course

You must complete a minimum of 63 units of courses (typically 7 courses of 9 units each) from H&SS or CFA to graduate. Within these 63 units you must take one writing coursesand one course from each of three different breadth categories listed below. This leaves 27 units more, to be filled by electives (which can, but do not have to, come from these same categories).

- The English writing course is Interpretation and Argument (76-101). Non-native English speakers must take a placement test: depending on the results, they may have to register for Introduction to Reading and Writing (76-100) in the fall.
- Category 1: Cognition, Choice and Behavior
- Category 2: Economic, Political, and Social Institutions
- Category 3: Cultural Analysis

I advise you to finish these four requirements in your first four semesters at CMU. In fact, I advise you to take the writing course in your freshman year: students registering earlier will be able to take 76-101 this fall; students registering later may find no more seats available, and they will take this course in the spring (we get more seats reserved in the spring). Here is a short list of course from these categories. The courses underlined are the typical freshman choices and have the most seats open for freshmen. See page 319 of the CMU catalog for a complete list (comprising almost 60 courses)

| Category 1<br>Cognition, Choice and Behavior | Category 2<br>Economic, Political and Social Institutions | Category 3<br>Cultural Analysis |
|---|---|---|
| 80-150  Nature of Reason<br>80-180  The Nature of Language<br>80-181  Language and Thought<br>80-270  Philosophy of Mind<br><br>85-100  Introduction to Intelligence in Humans, Animals and Machines<br>85-261  Abnormal Psychology | 73-100  Economic Principles<br><br>79-222  Religion in American Society<br>79-223  Protest and Dissent in American History<br><br>80-136  Ethics and Public Policy<br><br>88-104  Decision Processes in American Political Institutions<br>88-205  Comparative Politics | 57-173  Survey of Western Music History<br><br>79-259  Introduction to Religion<br><br>76-232  African-American Studies<br><br>79-104  Introduction to World History<br>79-241  African-American History I<br>79-242  African-American History II<br><br>80-100  What Philosophy Is |

If you have AP/IB/Cambridge (or transfer) credit for a course in one of these three categories, initially select a course that satisfies a different category. Check section XII *AP/IB/Cambridge Exam Credit*, in this document (on the next page) for CMU's policy.

If you have an AP/IB/Cambridge English exam score of 5/7, you have two options:

- Take Interpretation and Argument (76-101) to satisfy the Humanities writing requirement and use your AP/IB/Cambridge exam for credit in a Humanities elective, English General Elective. (76-011).
- Take a 200-level writing course from the list below. When you pass that course, your AP/IB/Cambridge exam will give you credit for Interpretation and Argument (76-101). The following courses are the only ones that satisfy this requirement. They will have seats reserved for freshman:
   - 76-239 Introduction to Film Studies
   - 76-245 Shakespeare
   - 76-270 Writing for the Professions
   - 76-347 American Fiction
  To use this option, you must first contact Kelly Delaney (kellydel@andrew.cmu.edu) in the English department; she will register you in the class that you want. Don't contact her until you start registering via OLR.

# XI.    Taking Other Courses

To take courses in modern languages or fine arts (e.g., art, design, drama, or music), you will have to contact that department and talk to the appropriate people there. Your Orientation Counselor will be able to direct you to departmental offices during orientation. If you live in or near Pittsburgh, you might be able to do that this summer but please note that many of the faculty with whom you would speak are not here during the summer. You probably should wait until you arrive on campus for Orientation Week. Some of these courses require testing, or an audition, or the presentation of a portfolio to gain entry. You should be able to start those arrangements during Orientation Week. I cannot make these contacts for you: face-to-face conversations frequently yield the best results. Email may or may not work depending on the travel schedules and office schedules of the individual to whom you send mail. Many of the faculty and advisors are off campus during the summer and return the week of Orientation.

# XII. Listing of AP, IB, and Cambridge A Exam Credit

The following table tersely summarizes CMU's AP/IB/Cambridge Policy. I typically receive AP scores in the middle of July, but the reports are often incomplete. Therefore, I am requesting that YOU send me ALL YOUR SCORES (for this year, and all previous years), whether or not you expect to be granted credit for them. There is an online form for listing all your AP/IB/Cambridge scores; in addition, you should send me (by mail, fax, or scanning and emailing) the official documentation of your scores. Note that credit is given only for the Higher/Advanced level IB/Cambridge A exams.

| Subject: AP (IB){Cambridge} | Score: AP (IB) | Course Awarded | Units |
|---|---|---|---|
| Art History | 5 | 60-011 | 9 |
| Biology (Biology) {Biology} | 4 / 5 (6 / 7) {B/A} | 03-011/03-110 * | 9 |
| Calculus AB (Math with Further Math){Mathematics C} | 4 or 5 (6) {B} | 21-120 ** | 10 |
| Calculus BC(Math with Further Math){Mathematics C} | 4 or 5 (7) {A} | 21-120 & 21-122 ** | 10+10 |
| Chemistry (Applied-Chemistry) {Chemistry} | 4 / 5 (6 / 7) {B/A} | 09-101 & 09-105 / 09-101 & 09-105 & 09-106 | 3+10 / 3+10+10 |
| Comp. Sci. A | 4 or 5 | 15-100 | 10 |
| Comp. Sci. AB (Computer Studies) {Computing} | 4 / 5 (6 / 7) {B/A} | 15-100 / 15-100 & 15-200 | 10 / 10+9 |
| Economics: Macro (Economics){Economics} | 4 or 5 (6 or 7) | 73-011 | 9 |
| Economics: Micro | 4 or 5 | 73-012 | 9 |
| English Lang/Lit & Comp (Eng. A1, B-Pilot, B) | 5 (7) | 76-011 *** | 9 |
| Environmental Science | 4 or 5 | 66-210 | 9 |
| (Experimental Science) | (6 or 7) | 38-011 | 9 |
| European History (History of W. and S. Europe) | 5 (7) | 79-011 | 9 |
| French Lang; French Lit | 4 / 5 | 82-201 / 82-201 & 82-202 | 9 / 9+9 |
| Geography (Geography) | 4 or 5 (6 or 7) | 66-011 | 9 |
| German Language | 4 / 5 | 82-221 / 82-221 & 82-222 | 9 / 9+9 |
| Govt. & Politics: Comp | 4 or 5 | 88-011 | 9 |
| Govt. & Politics: US | 4 or 5 | 88-012 | 9 |
| (History/Culture of Islamic World) | 7 | 79-013 | 9 |
| (History of Africa, of E/SE Asia, of Americas) | 7 | 79-014 | 9 |
| Human Geography | 4 or 5 (6 or 7) | 66-011 | 9 |
| Italian Language and Culture | 4 / 5 | 82-261 / 82-262 | 9 |
| Latin Lit; Latin Virgil (Latin) | 4 / 5 (6 / 7) | 82-011 / 82-011 & 82-012 | 9 / 9+9 |
| Music Theory (Music) | 4 or 5 (6 or 7) | 57-012 | 9 |
| (Organization and Management Studies) | (6 or 7) | 70-101 | 9 |
| (Philosophy) | (6 or 7) | 80-011 | 12 |
| Physics C: Mechanics (Physics) {Physics} | 5 (7) {B/A} | 33-111 | 12 |
| Physics C: E & M {Physics} | 5 {B/A} | 33-112 | 12 |
| Psychology (Psychology) | 4 or 5 (6 or 7) | 85-102 | 9 |
| (Social Anthropology) | (6 or 7) | 79-201 | 9 |
| Spanish Lang; Spanish Lit | 4 / 5 | 82-241 / 82-241 & 82-242 | 9 / 9+9 |
| Statistics | 4 / 5 | 36-011 / 36-201 | 9 / 9 |
| {Further Mathematics C} | B / A | 36-225 | 0++ |
| Studio Art: 2-D Design (Art/Design) | 4 or 5 (6 or 7) | 51-011 | 9 |
| Studio Art: 3-D Design | 4 or 5 | 51-012 | 9 |
| Studio Art: Drawing | 5 | 60-012 | 9 |
| U.S. History | 5 | 79-012 | 9 |
| World History | 5 | 79-104 | 9 |

At CMU, only students scoring above 3 (5) on an AP (IB) exam receive any kind of credit. In fact, for some exams, only students scoring a 5 (7) will receive credit. See the details on the left for individual classes.

* With an AP (IB) Biology score of 5 (7){A}, students can elect to take a special exam. Students who pass this exam will receive credit for 03-121 instead of 03-110
** Credit and placement for Calculus depend on the results of an On-Line Calclus Placement Exam, as well as AP (IB) {Cambridge} exam scores. Also, credit for Calculus courses is conditional upon successful completion of a subsequent Math course.
*** 76-011 cannot be used to satisfy the freshman Writing requirement. Students who receive credit for 76-011 have the option of taking 76-101 (the freshman writing course) or one of a published upper-level writing courses to satisfy the Writing requirement.
+ Heat and thermodynamics are not covered on the AP exams. Students are responsible for learning these areas themselves.
++ Placement out of 36-225 (not credit). If student passes 36-226, credit is awarded for 36-225

**Conditional AP/IB/Cambridge Credit for Calculus and Computer Science**
Calculus and Computer Science AP/IB/Cambridge credit are awarded as conditional credit: you won't receive final credit for these courses until you have passed the next course in the sequence. For example, if you have AP Calculus AB credit, you should sign up for 21-122 in the fall. When you pass 21-122, your credit for 21-120 will be finalized. If you have credit for AP Calculus BC (4 or 5), you will receive final credit when you pass a 200 level math course (e.g., 21-141 or 21-259). Finally, recall that you must also score well enough on the On-Line Calculus Placement Exam to receive CMU credit.

**Conditional AP/IB/Cambridge Credit for English**
English AP/IB/Cambridge credit is also conditional upon passing a designated writing course at Carnegie Mellon. So, if you receive a 5 on the Language and Composition AP exam and/or the Literature and Composition AP exam, you must choose one of the following two options:
- Receive credit for Interpretation and Argument (76-101) upon completion of an upper-level English writing course.
- Receive credit for English General Elective (76-011) upon completion of 76-101.

Whichever option you choose, you should complete a writing course during your freshman year.


# XIII. Transfer Credit Procedures

You may have taken college courses prior to coming to CMU. To receive transfer credit you need to provide me with the following materials:
- A transcript with a final grade for the course
- A syllabus for the course

Mark Stehlik, the Assistant Dean for Undergraduate Education, will decide exactly how the credit is awarded.

If your high school offered a college level course, you may receive transfer credit. You need to provide me with:
- A copy of the table of contents of the book that indicates which chapters were covered.
- A description of the level of difficulty of the course from your instructor, if available.
- A transcript with a final grade

Again, you should send me (by mail, fax, or scanning and emailing) the official documentation.

Do not just send me a URL for this documentation. I have to work with 140+ sets of incoming student records and simply do not have the resources to verify the URL and print it for you. Likewise, do not send more information than is necessary: copy just the pertinent sections and send them. The clearer and more organized your information is, the easier it is for me to present your case to Mark clearly. If I have any questions or doubts, or if materials are missing or insufficient, I may wait until I see you in August to finish up your transfer credit requests.

The transcripts that you already sent to CMU are not sent to me. So, I do need a copy for your records for my files. So please send me a copy. **Do not send the originals**, but please bring the originals with you in August.

Not all high schools teach college level courses. The depth and rigor of the course must be established to be college level for credit to be awarded. This proof is your responsibility. High school courses that are very similar to college courses do not typically qualify as college level courses. If you are worried that the college version of the same course will be boring to you, schedule a different course. Otherwise you may find the course will have a large review component during the term.

You need to document all your transfer credits before you register. This is especially important if you plan on using a transfer credit to satisfy a prerequisite requirement for a course you want to take this fall. If you cannot get these materials in time to send them to me before registration, you should be sure to see me in August as soon as possible, so that we can discuss this matter (issues not directly related to fall registration typically will get resolved during the fall semester).

**How Credit is Awarded**
AP/IB/Cambridge (and transfer) credit for a course adds that course's units to your overall completed unit total and satisfies part(s) of your graduation requirement. For example, if you have credit for Introduction to Physics for Science Students I (33-111), 12 units will be added to your overall completed unit total and you will have satisfied one of the four science/engineering course requirements. The second to last page of this document is a checklist of the courses that you must satisfy in order to graduate with a B.S. in Computer Science. You will revisit this information with your advisor, every semester, as we chart your progress towards graduation.

There are no grades recorded for transfer credit, so they are not used for computing your grade point average or class rank.

## XIV. Sample Fall Schedules

Below are three sample schedules. Each has a brief biography of the student building the schedule. There is another document with even more sample schedules that you can read.

The first student has no AP or transfer credit. He/she took a one semester computer literacy course in high school, but has done very little programming.

| | | |
|---|---|---|
| 15-100 | Introductory/Intermediate Programming | 10 |
| 15-128 | Freshman Immigration Course | 1 |
| 21-120 | Differential and Integral Calculus | 10 |
| 21-127 | Concepts of Mathematics | 9 |
| 33-111 | Physics for Science Students I | 12 |
| 76-101 | Interpretation and Argument | 9 |
| 99-101 | Computing Skills Workshop | 3     54 units total |

The second student has AP credit for Calculus AB, Physics C: Mechanics, and English. He/she took a solid Java programming course in high school (but not the AP exam).

| | | |
|---|---|---|
| 15-128 | Freshman Immigration Course | 1 |
| 15-200 | Advanced Programming/Practicum | 9 |
| 21-127 | Concepts of Mathematics | 9 |
| 21-122 | Integration, Differential Equations, and Approximation | 9 |
| 33-112 | Physics for Science Students II | 12 |
| 80-100 | What Philosophy Is | 9 |
| 99-101 | Computing Skills Workshop | 3     52 units total |

The third student has AP credit for CS AB (scored a 5) for Calculus BC, Chemistry, and Physics C.

| | | |
|---|---|---|
| 15-128 | Freshman Immigration Course | 1 |
| 15-123 | System Skills in C | 12 |
| 21-127 | Concepts of Mathematics | 9 |
| 21-241 | Matrix Algebra | 9 |
| 73-100 | Economic Principles | 9 |
| 76-101 | Interpretation and Argument | 9 |
| 99-101 | Computing Skills Workshop | 3     52 units total |

## XV. Hints for Reading the Class Schedule

Like everything new, reading the Class Schedule can seem daunting, but you will soon master it. Persevere.

Recall that courses that meet both in Lecture and Recitation have a Lecture **number** and Section **letter**. For such courses, the lectures correspond to one large group meeting and the sections correspond to recitations that are much smaller. Typically one will meet Monday/Wednesday/Friday and the other Tuesday/Thursday. Please note that you are required to attend all course meetings –it is not a case of pick and choose between Monday/Wednesday/Friday or Tuesday/Thursday. Some courses meet just in Sections (again, specified by a letter); there is no lecture for these courses. Below is an illustration of a course that meets in two lectures and 11 recitations. For it, you will be in class 5 days/week.

| Number | Title/Units | Lec/Sec | Day | Begin | End | Room | Instructor |
|---|---|---|---|---|---|---|---|
| 21120 | Differential & Integral Calculus | | | | | | |
| | 10 | Lec 1 | MWF | 08:30AM | 09:20AM | PH 100 | Walker |
| | | A | TR | 08:30AM | 09:20AM | WEH 8427 | Instructor TBA |
| | | B | TR | 08:30AM | 09:20AM | OSC 200 | Instructor TBA |
| | | C | TR | 09:30AM | 10:20AM | DH 2122 | Instructor TBA |
| | | D | TR | 09:30AM | 10:20AM | PH 226B | Instructor TBA |
| | | E | TR | 12:30PM | 01:20PM | DH 1217 | Instructor TBA |
| | | F | TR | 03:30PM | 04:20PM | WEH 6423 | Instructor TBA |
| | | Lec 2 | MWF | 09:30AM | 10:20PM | PH 100 | Walker |
| | | G | TR | 11:30AM | 12:20PM | SH 220 | Instructor TBA |
| | | H | TR | 11:30AM | 12:20PM | TBD | Instructor TBA |
| | | I | TR | 12:30PM | 01:20PM | PH A29 | Instructor TBA |
| | | J | TR | 01:30PM | 02:20PM | WEH 8427 | Instructor TBA |
| | | K | TR | 04:30PM | 05:20PM | SH220 | Instructor TBA |

**Number/Title/Units**: The course number and title appear on the top line, with the number of units appearing beneath the title. Note that the first two digits of the number correspond to its department: 15 is CS, 21 is Math, 76 is English, etc. Of the remaining three digits, the first digit categorizes the course by level: 1 for freshman, 2 for sophomore, 3 for junior, 4 for senior, >4 for graduate. This categorization is approximate, but most freshmen should stick with 100- or 200-level course. This 10 unit course meets in both lecture and recitations/sections.

**Lec/Sec**: There are two lectures (1-2) and eleven recitations (A-K). Note that recitations are automatically associated with the lecture above them: sections A-F are associated with lecture 1 and sections G-K are associated with lecture 2. When you register, you register just for a recitation; when you do so, OLR automatically registers you in the associated lecture as well. It is important to attend the lecture that corresponds to your section, as different teachers may sequence the material they teach differently. Even the same instructor teaching two different lectures might move at a different pace.

**Day**: The pattern of M/W/F for lecture and T/R for recitation is very common in Mathematics and Science courses.

**Being/End**: Most (3-day) lectures and recitations meet for 50 minutes; you then have 10 minutes to get to your next class.

**Room**: PH 100 is Porter Hall 100; WEH 8427 is Wean Hall 8427. You'll soon learn these abbreviations and find favorite buildings/rooms. TBD means To Be Determined.

**Instructor**: Often the lecture is taught by a faculty member and the recitation by a graduate student (although sometimes the lecturer will also lead one recitation). TBA means To Be Arranged.

Below is an illustration of a course that meets in sections only. So, you will be in class three days per week.

| Number | Title/Units | Lec/Sec | Day | Begin | End | Room | Instructor |
|---|---|---|---|---|---|---|---|
| 03121 | Modern Biology | | | | | | |
| | 9 | A | MWF | 01:30PM | 02:20PM | DH 2315 | Brown, Burkett |
| | | B | MWF | 02:30PM | 03:20PM | DH 2315 | Brown, Burkett |

Here you register either for section A or B. The only difference between these sections is they meet at different times. The same faculty members are responsible for each section (or, they just haven't decided who will teach which yet).

**Miscellaneous Information**

Courses whose number starts with **98** (and/or whose title starts with **STUCO**) are STUdent Courses: courses taught by CMU students for other CMU students. Like PE (Physical Education) courses, are are 3 units and can be taken only pass/fail. These units count towards graduation (up to a maximum of 9 units), but they are not used to compute your grade point average. Mostly, these courses are for fun. You may find yourself teaching such a course before you leave CMU.

Finally, if you see a course whose days are **UTR**, that course is given by CMU's campus in the middle-east country of Qatar. Obviously, do not try to register for any course meeting at the Qatar campus.

**Some Words About Multiple Degrees, Multiple Majors, and Minors**

First, peek at the next page. Survey the courses needed to graduate with a CS degree. Note the average course is 9 units.

To graduate, every SCS student must complete a minor (unless he/she is doing multiple degrees or majors; see below). A minor typically requires about 6 courses (specified for that minor in the catalog) in another discipline. This is about half of the number of courses needed for a major. SCS students take a minimum of about 12 CS courses. Some students do multiple minors.

The difference between multiple degrees and multiple majors is a bit confusing (see page 58 of CMU's catalog for details). I'll try to explain the difference simply (and therefore a bit inaccurately). A second major typically requires 12 courses in that major (and there may be double-counting restrictions). A second degree requires everything that a second major in that discipline would require; in addition, you must complete any courses required by the College issuing the degree (e.g., any MCS degree requires 1 Biology, 1 Chemistry, and 2 Physics courses). Also, students pursuing a second degree must have at least 90 units more than the minimum required for their first degree. So, with a CS student, you'll need at least 450 total units upon graduation for a second degree. These units can come from any department, but it's expected that most will be from the second degree department.

Here are some statistics from the graduating class of 2006. Of 136 students, 81 earned 1 major and 1 minor; 10 earned 1 major and 2 minors, and 2 earned 1 major and 3 minors. 31 students earned double majors: of these 25 earned no minor, 5 earned 1 minor and 1 earned 2 minors. Finally, 12 earned double degrees. See the document linked as **Undergraduate Degree Statistics, 2006** for these same statistics, but also broken down by second degree/major and minor (to see which ones are popular and which ones are possible).

# XVI. Course Checklist: among all the courses you take, these are requirements

| Number | Category and/or Course Name | Units |
|---|---|---|
| xx-xxx | Science/Engineering: _____ | _____ |
| xx-xxx | Science/Engineering: _____ | _____ |
| xx-xxx | Science/Engineering: _____ | _____ |
| xx-xxx | Sci/Eng Lab: _____ | _____ |
| | | |
| 99-10x | Computer Skills Workshop | _____ |
| | | |
| 15-100 | Introductory/Intermediate Programming | _____ |
| 15-200 | Advanced Programming/Practicum (soon to be renumbers in the 100s) | _____ |
| 15-123 | Effective Programming in C and Unix | _____ |
| 15-128 | Freshman Immigration Course | _____ |
| 15-211 | Fundamental Data Structures and Algorithms | _____ |
| 15-251 | Great Theoretical Ideas in CS (2$^{nd}$ Discrete Math course) | _____ |
| 15-212 | Principles of Programming | _____ |
| 15-213 | Introduction to Computer Systems | _____ |
| 15-221 | Technical Communication for Computer Scientists | _____ |
| 15-451 | Algorithm Design and Analysis | _____ |
| 15-xxx | Applications | _____ |
| 15-xxx | Fundamentals of Algorithms | _____ |
| 15-xxx | Fundamentals of Programming | _____ |
| 15-xxx | Systems Course | _____ |
| 15-xxx | CS Elective: _____ | _____ |
| 15-xxx | CS Elective: _____ | _____ |
| | | |
| 21-120 | Differential and Integral Calculus | _____ |
| 21-122 | Integration, Differential Equations, and Approximation | _____ |
| 21-127 | Concepts of Mathematics (1$^{st}$ Discrete Mathematics course) | _____ |
| 21-241 | Matrix Algebra | _____ |
| | | |
| 36-217 | Probability Course (or 36-225 or 36-625):_____ | _____ |
| | | |
| 76-101 | Writing Course: _____ | _____ |
| | | |
| xx-xxx | Category 1: _____ | _____ |
| xx-xxx | Category 2: _____ | _____ |
| xx-xxx | Category 3: _____ | _____ |
| | | |
| xx-xxx | H&SS/CFA: _____ | _____ |
| xx-xxx | H&SS/CFA: _____ | _____ |
| xx-xxx | H&SS/CFA: _____ | _____ |
| | | |
| xx-xxx | Minor/Elective: _____ | _____ |
| xx-xxx | Minor/Elective: _____ | _____ |
| xx-xxx | Minor/Elective: _____ | _____ |
| xx-xxx | Minor/Elective: _____ | _____ |
| xx-xxx | Minor/Elective: _____ | _____ |
| xx-xxx | Minor/Elective: _____ | _____ |
| xx-xxx | Minor/Elective: _____ | _____ |
| xx-xxx | Minor/Elective: _____ | _____ |