ICS3M0 Course Summary (Mr. N. Nolfi)
Grade 11 Computer and Information Science (College/University)

Broad Objectives

Welcome to "ICS3M0, Computer and Information Science." In this course, you will spend most of your class time **analyzing problems** and **developing solutions**. The **emphasis** will be on

- **Improving** your **problem solving skills** and **expanding** your repertoire of **problem solving strategies**
- **Honing** your **communication skills**
- **Enhancing** your ability to **think** in a ***variety of different ways*** including both ***L-mode thinking***, the **analytical** and **rational** reasoning processes associated with the ***left*** hemisphere of the brain, and ***R-mode thinking***, the **creative** and **imaginative** (but not necessarily rational) thinking processes associated with the ***right*** hemisphere of the brain
- **Developing** your ability to **work**, **think** and **learn independently**

If you make a commitment to learning, by the end of the semester you will have achieved an unprecedented level of personal growth.

Course Overview (topics not necessarily covered in this order)

Understanding Programming through Graphics

- Programming as a form of teaching
- Algorithm Design
- Input / Processing / Output / Memory as a Model for Solving Problems with a Computer
- George Polya's Four Steps of Problem Solving
- Pseudo-Random Number Generation
- Tracing Program Execution (Memory Maps)
- Line Art and String Art
- Fractals
- Simple Animation
- Syntax and Logic
- Run-Time, Design-Time, Compile-Time
- Variables Objects, Properties, Methods
- Assignment Statements
- "For…Next" Loops (Repetition)
- Intrinsic Function Calls and Method Calls
- Operators and Operator Precedence (Order of Operations)

Advanced Algorithms

- Searching Techniques
- Sorting Techniques
- The Doomsday Algorithm (This is a case study of how a very complex problem can be solved by splitting it into several smaller, simpler problems.)
- Data Handling Techniques

Impact and Consequences

- Postsecondary Computer Education
- Careers Requiring Computer Expertise
- Careers in Information Technology (IT)
- Developments and Future Trends in IT
- How Computers Affect Privacy
- How Computers Affect our Daily Lives
- Computer-Related Crime
- How Computers Affect our Health and Safety
- Use Presentation Software to Describe Emergent Technologies
- Evolution of Programming Languages

Essential Problem Solving Strategies for Programming

- Solve a Problem by Investigating Specific Examples of the Problem
- Solve a Problem by Looking for Patterns
- Solve a Problem by Looking for Existing Solutions (i.e. Research)
- Solve a Simpler but Related Problem
- Solve a Problem by Making Reasonable Simplifying Assumptions
- Solve a Large, Complex Problem by breaking it down into Several Smaller, Simpler Problems (Modularity in Problem Solving)
- Top-Down, Bottom-Up and "Middle-Out" Programming
- Resolving Ambiguities and Missing Information in Problem Statements
- Different Modes of Thinking
- Using Electronic Tools to Solve Problems
- Debugging Strategies
- Identifying Limitations/Usefulness of Software
- Developing and Maintaining a Project Plan
- Importance of Internal and External Documentation
- Sequence, Selection and Repetition

Advanced VB

- Counted and Conditional Loops
- Nested Loops and Nested "**If**" Statements
- One-Dimensional and Two-Dimensional Arrays
- Global Variables versus Local Variables
- Formal Parameters versus Actual Parameters (Parameters versus Arguments)
- Parameter Passing and Variable Scope
- Space versus Time – The Eternal Conflict

Culminating Activities

- Annuities Software Development Project
- Video Game Project
  Each student in this course will develop his/her own video game in Visual Basic (VB). Students are discouraged from developing "shoot 'em up" games because VB has poor graphics support. Obtaining satisfactory results in VB for such games requires learning about the Windows GDI API, the Windows Direct-X API or the OpenGL API. Learning to use one or more of these APIs may require far more time than is available in a one-semester course. Students are encouraged to develop strategy games, puzzle games or any games that do not require a great deal of graphical processing power.

Who Should Take This Course	*Who Might Struggle with this Course*	*Who Should Not Take This Course*
• Have strong mathematical skills • Are hard working • Are well organized and responsible • Do not waste class time socializing • Enjoy working with computers • Are punctual (come to class on time) • Attend school regularly	*Students who have weak mathematical skills generally find this course difficult. However, with a great deal of effort and perseverance, **success** is still **very likely** for such students.*	• Have weak mathematical skills • Are not hard working • Are disorganized and irresponsible • Waste class time socializing • Do ***not*** enjoy working with computers • Are ***not*** punctual (Don't come to class on time) • Do ***not*** attend school regularly

Evaluation

Knowledge and Understanding (KU)	**15%**	**EVALUATION POLICY** Tests and other forms of in-class evaluations will always be announced ahead of time. Students who know that they will be absent for such an evaluation (e.g. field trips, school sports, appointments, etc.) should arrange ***in advance*** to write at an alternate time. Failure to do so may result in an incomplete evaluation. Students who are absent for legitimate reasons (e.g. illness, attending a funeral, family problems, etc.) but who have not arranged in advance to write at an alternate time may do so upon presentation of a note from a parent or guardian. All students are expected to complete all assignments! **Failing to complete assignments and other evaluations significantly increases the risk of failure!**
Application (APP)	**20%**	
Thinking, Inquiry and Problem Solving (TIPS)	**20%**	
Communication (COM)	**15%**	
Final Evaluation (6.4% KU, 8.6% APP, 8.6% TIPS, 6.4% COM)	**30%**	

TERM EVALUATIONS

The evaluations during the term will consist mostly of tests and assignments. For both types of evaluations, the students will be asked to complete written work as well as to perform practical tasks using computers (and possibly other electronic tools).

FINAL EVALUATIONS

The final set of evaluations for this course consists of ***two*** parts, one of which is a final culminating activity to be completed ***in class*** during the final weeks of classes. The second part is completed during the final evaluation period.

CHEATING ON EVALUATIONS AND SUBMITTING PLAGIARIZED WORK

The ***learning of the students*** is ***the reason*** for the existence of Ontario's public education system! Students who cheat accomplish ***nothing*** other than revealing their dishonesty and intellectual cowardice. Students who cheat are ***defeating themselves*** by failing to take advantage of learning opportunities! ***Therefore, in my class, cheating and plagiarism will not be tolerated!*** In addition to the strong possibility of disciplinary action, a mark of ***zero*** will be assigned for cheating or for plagiarism.

COURSE NOTES

Since there is no textbook for this course, most of the course notes will come in the form of documents created by Mr. Nolfi. Most of these documents can be obtained at www.misternolfi.com. To be successful in this course, ***all students must read the notes carefully and complete all activities***. In addition, each student must use a three-ring binder for collecting notes. The notebooks should include

- A divider for each of the units described above
- All blackboard notes and any photocopied handouts (you must include the date on each sheet in case you are ever absent or in case you drop your binder and your notes become shuffled)
- Any notes from www.misternolfi.com that the student wishes to print out
- All assignments, activities, evaluations, etc

HOMEWORK

Since much of the work in this course requires the software that we use in room 224, formal homework will not be assigned very often. **Nonetheless, *students will be expected to review their notes daily***. To be successful in this course, ***students must***

- Spend 15 to 30 minutes each day reviewing their notes (**No excuses! The notes can be found at** www.misternolfi.com!**)**
- Make summary notes once per week (summarize the most important concepts learned)
- Ask for help whenever needed
- Use the computers in room 224 before school or after school to finish assignments that are not completed during class time. (On most days, room 224 remains open until at least 4:30 pm. If you are fortunate enough to have the appropriate software installed on your home computer, please take advantage of it!)
- Take an active role in their learning

PUNCTUALITY

Students who are frequently late for class miss important learning experiences and cause unnecessary disruptions to the learning of other students. In addition, such students often set a negative pattern that will likely be difficult to break later in life. In school, the consequences for tardiness are usually not severe. In the workplace, however, lack of punctuality generally leads to dismissal (i.e. firing)! To encourage students to be on time for class, tardy students must choose one of the following consequences:

- Do **five push-ups** (in front of the class) **for every minute late**
- Stay after school **five minutes for every minute late** to help clean up our classroom

(Students who smoke are very often late for class because of their desire to "have a smoke" in between classes. Such students are usually suffering from nicotine addiction and may require medical treatment for their nicotine dependence. Students who do not smoke find it much easier to remain focused on their classes and they also enjoy the very strong likelihood of better health.)

BEING EXCUSED FROM CLASS

Students must use all class time for the express purpose of learning! This cannot be accomplished if students often ask to be excused from class. Occasionally, however, it is necessary for students to leave class to use a washroom. As long as the privilege of washroom breaks is not abused, permission will be granted. Those who ask to be excused frequently, however, will be placed on a "Potty Pass" system allowing only three washroom breaks per month. Students who leave class for unreasonably long periods will forfeit washroom privileges altogether! If a student has a medical condition that necessitates frequent use of a washroom, permission for such will be granted upon presentation of a medical certificate.