

University of Macau
General Education Program
CISG113 Information Security and Privacy
Department of Computer & Information Science
Faculty of Science & Technology

Learning Syllabus

Part (A) Course Outline

Elective GE course in *IT and Knowledge Society – Science and Information Technology*

Catalog description:

3.0 credits (lectures: 2 x 1.5 hours). This course exposes students to a broad range of computer systems and information security topics. It is designed to provide a general knowledge of information security and privacy, including basic concepts, terminologies, and social issues. The course introduces core information technology concepts such as Internet and communication technologies with the social and ethical concerns regarding security and privacy. Our discussion explores different areas of concerns from both the user and the IT professional's perspective, such as laying out various security vulnerabilities and possible threats, and discussing different technical and legal countermeasures to address the same. This course also shares some core topics with other General Education courses in the category of "Information Technology and Knowledge Society": namely, IT and knowledge society basics; ethics and social responsibility in the information age; the digital divide in the 21st century; and issues of information literacy and competency.

Course type: General Education for Year 1 and Year 2 students

Prerequisites: None

Textbook(s) and other required material:

Easttom, C. (2012). *Computer security fundamentals*, 2e. Indianapolis, Indiana, USA: Pearson/Prentice Hall.

References:

Andress, J. (2010). *The basics of information security: Understanding the fundamentals of InfoSec in theory and practice*. Waltham, MA: Syngress (Elsevier).
Lehtinen, R., Russell, D., & Gangemi, G.T., Sr. (2006). *Computer security basics*, 2e. Sebastopol, CA: O'Reilly
O'Leary, T., & O'Leary, L. (2009). *Computing essentials 2010: Complete edition*. Career Education. 20th edition.
Pfleeger, C.P., & Pfleeger, S.L. (2006). *Security in computing*, 4e. New York: Pearson Education.

Desired mental and practical makeup:

1. Experience in group-based project work.
2. Use of e-Learning platforms such as Moodle.
3. Mentality that learning is not a spectator sport, but a down-to-earth learn-to-learn process of learning-by-doing.

Course objectives:

- To help students become literate in the fundamental understanding of information security and privacy associated with the Internet era, including concepts of computer and communications insecurity using modern-day examples.
- To encourage students to formulate and express their views on the design of information security and privacy, through case study, written work, oral presentations and classroom discussions.
- To raise students' awareness of the impact of information security and privacy on the computer industry and the wide-spread focus of insecurity issues from various applications, through critical discourses on the use of secured communications for purposeful human endeavors.

Topics covered:

- Introduction (2 hours): What is Information Security? What is Information Privacy?
- Common Module 1 (2 hours): Introduction to IT and Knowledge Society
- Common Module 2 (2 hours): Ethics and Social Responsibility in the Information Age
- Common Module 3 (2 hours): The Digital Divide in the 21st Century
- Common Module 4 (2 hours): Information Literacy and Competency
- Topic 1 (2 hours): Privacy and Encryption
- Topic 2 (2 hours): Web Attacks and Internet Vulnerabilities
- Topic 3 (2 hours): Ethical Issues of Hacking and Cracking
- Topic 4 (2 hours): Information Fraud
- Topic 5 (2 hours): Wireless Network Security
- Topic 6 (2 hours): Computer Crimes
- Topic 7 (2 hours): Countermeasures – Techniques and Law-Making

Class/laboratory schedule:

Timetabled work in hours per week			No of teaching weeks	Total hours	Total credits	No/Duration of exam papers
Lecture	Tutorial	Practice				
3	0	0	14	42	4.0	0 / 3 hours

14-Week Semester: Two weekly 90-minute lectures

Student study effort expected:

Class contact:	
Lecture	42 hours
Tutorial	0 hours
Hands-on practice	0 hours
Other study effort	
Self-study	20 hours
Homework assignments	14 hours
Project / Case study	14 hours
Total student study effort	90 hours

Assessment for student learning:

Items for Assessment	Total Semester Percentage (100%)
Three Learning Contracts (10% x3) <ul style="list-style-type: none"> • Individual assignments • Pair assignments • Team assignments 	30%
Project Work – Learning Portfolio (Individual Profile)	20%
Learn-to-Learn Activities (Reading + Online Activities)	15%
In-Class Participation (Presentation, Discussion, Group work)	20%
Mid-Term Examination (Discussion Questions)	15%

NB There is no final examination installed for this General Education course: Coursework = 100%.

Assessment for course objectives:

The assessment to meet course objectives will be done in a formative and summative manner on the basis of the following items of interest:

- All related measures included in Assessment for Student Learning (above);
- All related assessment data (electronic records of homework, assignments, presentations, digital stories, online discussions, wiki collaborative writing, and self as well as peer review reports for measuring student learning) from UMMoodle course site of CISG113 – student learning portfolio;
- The course portfolio established on UMMoodle site of CISG113, throughout the semester, keeping track of the course enactment details, lesson-by-lesson in a week-by-week manner.

Course Outline (Refer to our UMMoodle site for detailed learning activities):

Weeks	Topic	Course work
1	<p>Introduction – Inception Period to measure student background knowledge and to position for immediate kick-off of course learning</p> <p>What is Information Security? What is Information Privacy?</p>	<p>Online learning journals on UMMoodle course site</p>
1	<p>Elaboration of CISG113 Learning-Centered Syllabus with intended learning outcomes and topics of interest clearly delineated, together with the peculiar design of student learning experience, in terms of individual, pair, and group learning episodes in the context of information security study; Kick-off of inquiry-based learning (IBL), self-regulated learning (SRL), and problem-based learning (PBL) through subsequent learning contracts</p>	<p>Online learning journals on UMMoodle course site</p>
2, 3, 4	<p>Learning Contract 001, inquiring about</p> <ul style="list-style-type: none"> • Introduction to IT and Knowledge Society • Ethics and Social Responsibility in the Information Age • The Digital Divide in the 21st Century • Information Literacy and Competency 	<p>Online learning journals and discussion forums on UMMoodle course site</p>
5, 6, 7	<p>Learning Contract 002, inquiring about</p> <ul style="list-style-type: none"> • Privacy and Encryption • Web Attacks and Internet Vulnerabilities • Ethical Issues of Hacking and Cracking • Information Fraud 	<p>Online learning journals, discussion forums, and collaboration wikis on UMMoodle course site</p>
8, 9, 10	<p>Learning Contract 003, inquiring about</p> <ul style="list-style-type: none"> • Wireless Network Security • Ethical Issues of Hacking and Cracking • Computer Crimes 	<p>Online learning journals, discussion forums, and collaboration wikis on UMMoodle</p>

	<ul style="list-style-type: none"> Countermeasures – Techniques and Law-Making 	course site
11, 12, 13	<p>Student Learning Portfolio, capturing, assessing and showcasing personalized learning evidences related to the three learning contracts</p> <ul style="list-style-type: none"> Self and Peer Review of Student Work in IBL, SRL, and PBL through the submitted reports of Learning Contracts (001 – 003) Collection of student learning artifacts, such as class discussion and presentation videos (or digital stories) and PowerPoints, as well as the wiki collaboration records, discussion forums, and personal learning journals Student reflections on each item collected into the Learning Portfolio 	Student e-Portfolios created via third party tools on UMMoodle course site
14	Final Examination Review to summarize the materials learned throughout the semester	
14	Preparation of Course Portfolio as an important archive of course enactment and student learning to accrue evidence for formative course evaluation	

Course delivery:

Most of the course delivery is done through lecture and discussion, plus collaborative in-class exercises; blended learning approach combining face-to-face interactions with online (Web-based asynchronous) course support and collaborative learning-by-doing, (via group project work to support team learning with case studies) is also practiced in this course.

Coordinator:

Prof. Chi Man Pun, Ph.D.

Persons who prepared this description:

Dr. Kam Hou Vat

Part (B) General Course Information and Policies

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Course : CISG113 Information Security and Privacy
Time/Venue : TBA

Grading Distribution:

Percentage Grade	Final Grade	Percentage Grade	Final Grade
100 - 93	A	92 - 88	A-
87 - 83	B+	82 - 78	B
77 - 73	B-	72 - 68	C+
67 - 63	C	62 - 58	C-
57 - 53	D+	52 - 50	D
below 50	F		

Comment:

The objectives of the lectures are to explain and to supplement the text material. Students are responsible for the assigned material whether or not it is covered in the lecture. Students who wish to succeed in this course should read the assignments prior to the lecture and should work all homework and in-class exercises. Students are encouraged to look at other sources (other texts, and literature items) to complement the lectures and text.

Homework Policy:

The completion and correction of homework is a powerful learning experience; therefore:

- There will be approximately three major homework assignments.
- Homework is due three weeks after assignment unless otherwise noted.
- No late homework is accepted, unless an application is filed prior to submission with valid reason
- The course grade will partly be based on the average of the homework grades.

Course Project:

The project is probably the most exciting part of the course and provides students with meaningful experience to extend and enhance their learning:

- The requirements will be announced and discussed in class.
- The project will be presented towards the end of semester, including a digital story to be submitted by students.

Examinations:

One mid-term examination will be held in the semester, lasting for 90 minutes. The final examination is now replaced by a more formative form of student assessment throughout the semester: three learning contracts plus individual student learning portfolio.

Part (C) Design of Learning Experience

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Course Design Philosophy

The learning design in CISG113 is performed with several pedagogical objectives in mind, including:

- develop student responsibility in active learning
- make learning meaningful to student future study or vocational goals
- promote overt knowledge construction with down-to-earth practices
- perform learner assessment to stimulate further learning
- showcase learner achievements in terms of accessible records

In other words, I need a method of teaching, besides the conventional lectures with discussion, which could facilitate student learning to come close to the above-mentioned objectives. My past experience in constructivist design of student learning in the major courses from FST-DCIS, points me to the potential of problem-based learning (PBL) whose effective use has rendered many a flexibility and possibility in producing student learning under different course scenarios.

Problem-Based Learning (PBL)

PBL could be considered as one form of collaborative learning, in which students, divided into small groups, are actively engaged in opportunities for knowledge seeking, for problem solving, and for the collaborating necessary for effective learning. At the heart of PBL are some real-world problems (or scenarios) used to motivate students to identify and research the issues and principles they need to know to work through those problems. The design of a PBL learning experience addresses many of the recommended and desirable outcomes of a quality undergraduate education, such as the ability to perform the following:

- Think critically and be able to analyze and solve complex, real-world problems
- Find, evaluate, and use appropriate learning resources
- Work cooperatively in teams and small groups
- Demonstrate versatile and effective communication skills, both verbal and written
- Use content knowledge and intellectual skills acquired at the University to become continual learners

The notion of PBL is based on the premise that students learn more effectively when they are presented with a problem to solve rather than just being given instructions to absorb. Pedagogically, it is important that students be given opportunities to identify and search for the knowledge they need to approach the problem.

PBL Cycle of Collaboration

- *Problem analysis stage* – Students, divided into small groups and assigned a facilitator, are respectively presented a problem scenario to explore, without much instruction given. They generate ideas about possible solutions to the problem based on what they already know. They then define what they need to know by identifying the key learning issues and formulate an action plan to tackle the problem.
- *Information gathering stage* – A period of self-directed learning follows. Students are responsible for searching for relevant information. They are largely engaged in just-in-time learning as they are seeking for information when their need to know is greatest.
- *Synthesis stage* – After a specified period of time, students reconvene and reassess the problem based on their newly acquired knowledge. They become their own experts to teach one another in the group; they use their learning to re-examine the problem. In the process, they are constructing knowledge by anchoring their new findings on their existing knowledge base.
- *Abstraction stage* – Once the students feel that the problem task has been successfully completed, they discuss the problem in relation to similar and dissimilar problems in order to form generalizations.
- *Reflection stage* – At this stage, students review their problem-solving process through conducting a self- and/or peer-evaluation. This stage is meant to help students' meta-cognitive ability as they discuss the process and reflect on their newly acquired knowledge.

Essentially, PBL revolves around a focal problem, group work, feedback, and class discussion, skill development and continuous reporting. The instructor's role, after the upfront lectures, is to organize and pilot this cycle of learning activity, guiding, probing and supporting student initiatives along the way so as to empower them to be responsible in their own learning.

PBL Assessment Criteria to Measure Student Learning

It is my experience that the effectiveness of PBL could be evaluated in part by its ability to explain practice. Over the years of the PBL way to encourage student learning, the following criteria have been identified, in order to partially measure the learning outcomes accomplished by students, with respect to the process of problem diagnosis, action intervention, and reflective learning:

- *Learning is an active and engaged process.* Instead of being told what to do or how to solve problems, students within a PBL atmosphere are to generate their own learning issues. It is expected that a sense of ownership should be born leading to greater cognitive engagement. Students are actively engaged in working at tasks situated in an authentic setting which should lead to greater ability in transfer to other real-world contexts.
- *Learning is a process of knowledge construction.* PBL purports that learners construct their own knowledge. The constructivist epistemology states that the known is internal to the knower and is subjectively constructed based on individual responses to experience. Thus, in order to harness the reality of learning, we need to consider the opportunity to find knowledge for oneself, contrast our understanding of that knowledge with others' understanding, and then refine or re-structure knowledge as more relevant experience is gained.

- *Learners function at a meta-cognitive level.* Constructivist learning focuses on initiative thinking activities rather than working on the right answer the teacher wants. Students generate their own strategies for problem formulation and possible solutions. The instructor's role is that of a facilitator, a guide or a coach, probing students' thinking, monitoring their activities, and generally keeping the process moving. Thus, PBL should promote meta-cognition through encouraging students to reflect upon the problem-solving process. It is believed that reflection on recent experiences is an effective method of learning.
- *Learning involves social negotiation.* The constructivists accept that knowledge is socially negotiated. The quality or depth of our understanding can only be determined in a social environment where we can see if our understanding can accommodate the issues and views of others and to see if there are points of view which we could usefully incorporate into our understanding. The important support of a learning community where ideas are shared and discussed and understanding enriched is critical to the development of self-directed learning among PBL students.

Mechanism to Keep Evidence of Student Learning

To support the assessment of PBL student learning throughout the course delivery, we are to make the best use of our UMMoodle environment, which is to provide electronically a course space, accommodating (or hosting) different group spaces, and sufficient number of individual personal spaces for each student in class. Namely, each student should have his or her own Personal e-Space inside our Moodle course e-Space, and each PBL team is also assigned a Group e-Space under the same course e-Space. Such e-Spaces are installed to keep track of students' learning activities, such as personal journaling, group brainstorming, and collaborative project development.

Besides the basic UMMoodle environment, the use of portfolios as a tool for assessing student learning is planned. Such student portfolios are designed to provide authentic evidence of what students know, believe, and are able to do. Assessment of student learning is considered authentic when it focuses on real performance and mastery of a field of knowledge, as evidenced by some constructed responses to some real-world problem scenarios of interest. It is believed that the use of portfolios could transform the way to interact with and engage students in the learning process.

Since the portfolio is to document what students know and are able to do as a result of the course learning, students are expected to collect and select pieces of their own work over a period of time as evidence of completing their learning objectives. Usually, students also have to write a rationale to explain why they think the selected pieces are their best work. Teachers exercise their advising and mentoring role in the process, recognizing that when instruction is personalized through the UMMoodle environment, this type of authentic forms of assessment can appropriately characterize student performance.

Typically, a student portfolio may include different types of learning artifacts produced by the student: essays and other writing samples; logs or journals, or blogs; notes and reflections; observation checklist (teacher and students); peer evaluations; photographs related to projects; reading inventories and lists; reports (personal or group work); self-evaluations; solutions to problems; reflections on personal items of achievement; video and audio recordings of presentations and performances; and worksheets, and many others to be named. More relevantly, the use of electronic portfolios (e-portfolios) is getting more common to encourage active learning on the parts of students. It is intended that through the use of the Moodle environment, students can really appreciate the use of e-portfolios to demonstrate their learning, skills development and record their achievements over time, ready to be showcased to any selected audience.

Part (D) OBTL Approach in Course Delivery

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The OBTL Approach

OBTL is short for Outcomes-Based Teaching and Learning. It is a course delivery approach that encourages a deep and meaningful way for students to learn. In the field of education, OBTL represents a learner-centered approach to curriculum and course design that focuses on what the students are expected to learn and to do, rather than what the teacher expects to teach and to do. Operationally, OBTL is mainly powered up through the constructive alignment of three important elements in actions: ILO's (intended learning outcomes), TLA's (teaching and learning activities), and AT's (assessment tasks), including the provision of assessment rubrics:

- *Intended Learning Outcomes* (ILO's) are what students are expected to be able to do at the end of a lecture, a course, a project, a field trip or a program of study. They are expressed from the student perspective, in the form of some action verbs (identifying the learning outcomes), and related to criteria for assessing student performance. They are referred to as ILO's because in good learning environments, students may also learn many additional things about the academic subject, working with others, dealing with difficult people, teamwork, and other living and learning skills such as adaptability with emerging Web technologies and social media, which are not necessarily included in the ILO's.
- *Teaching and Learning Activities* (TLA's) are activities designed by academic staff (course instructors) to help students achieve the learning outcomes of the course, of the tutorials, of the lab sessions, of the lectures, of the projects, or of the field trips. The TLA's must be explicitly related to each ILO. For example, if an ILO is that students will develop the ability to solve particular types of problems, lecturing students about how to solve such problems will not be sufficient. Students will need practice, support and feedback in solving such problems.
- *Assessment Tasks* (AT's) are procedures designed to assess the related ILO's after the specific TLA's are identified that will help students achieve the ILO's. Oftentimes, creating the appropriate AT's is an iterative process involving different levels of review, revision, and development. For example, if an ILO is that students will develop skills in oral communication, then asking student to write an essay about oral communication does not assess the related ILO. Students need to engage in an act of oral communication which is assessed accordingly. Thereby, AT's could come in various forms such as essay-type assignments, projects, presentations, quizzes, role-plays, e-portfolio collection, and many others, our teachers ask students to do to demonstrate evidence that a particular ILO has been achieved.
- *Assessment Rubrics* (AR's) are standards (or criteria) explicitly devised to measure the performance of student achievement in the context of ILO's. They must be developed after the AT's have been

identified. For example, a course of study might define an 'A' as showing evidence of original thought or being able to critically analyze evidence, but a 'D' as being able to reproduce what was taught with no evidence of critical analysis or original thought. Each grade needs to have a grade descriptor, describing explicit differences between the grades. And grades, as a form of criterion-referenced assessment, are meant to describe what students can or cannot do rather than how their performance compares to other students.

At the University of Macau (UM), the outcomes-based approach to student learning is an expression of UM's commitment in elite undergraduate education (http://www.umac.mo/curriculum_reform/), taking into account the holistic concerns of student development. This outcomes-based education (OBE) approach calls for the articulation of what we expect our students to learn and to become, and the collection of evidence to determine whether our students have acquired the learning expected. It is believed that clear understanding and articulation of intended learning outcomes (ILOs) should facilitate the design of an effective curriculum and appropriate assessments to measure student achievement, as well as to provide strategic planning of personalized learning processes for individual students. Yet, this approach implies (indeed, demands) active participation from students (not just teachers) in the content and process of the conversational practice and knowledge construction in class. Both students and teachers must take joint responsibility for learning.

Student responsibility involves:

- Preparing for lectures by doing the reading indicated for each lecture;
- Participating in discussions during class time, and during our online forum discussions;
- Active involvement in journaling your learning, asking questions and finding answers;
- Being courageous and speaking your mind

Teacher responsibility as facilitator involves:

- Designing and guiding the collaborative learning process;
- Facilitating in-class conversational practices;
- Steering our course of learning;
- Providing inputs and feedbacks where necessary

Part (E) OBTL Details for CISG113

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Intended Learning Outcomes (ILO's)

Upon completion of this course, students should be able to:

1. Describe the importance of IT and the related ethical issues
2. Describe the principles and concepts related to information security and privacy
3. Outline and analyze the impacts of information security issues on information facilities
4. Describe the usage of various encryption methods and the related ethical issues
5. Analyze and explain the impacts of computer crime to the society
6. Apply technical and legal countermeasures to address information security threats

Teaching and Learning Activities (TLA's)

- *TLA01: Lectures* – This is a typical lecture setting but efforts are made to insert short questions regarding the lesson so that students have opportunities to discuss with one another. From time to time, students are asked to discuss among themselves for couple of minutes regarding a topic that has been taught, and are invited to pose their answers online through our UMMoodle course environment (online forum). This is to give students some space to relax between topics and provide a review of the lesson.
- *TLA02: Small Group Discussion* – This also includes the case of pair-based discussion involving only two students. Basically, divided into small groups during the discussion activity, students develop and practice higher-order cognitive skills as they explain, analyze, reflect, evaluate and theorize the working and trends underpinning issues of information security and privacy in today's world, especially regarding impact on our daily living. Each discussion group is equipped with a scribe volunteered by one of the group members to keep track of the learning issues raised, for subsequent class sharing. Typical length for this TLA02 varies ranging from 15 to 30 minutes.
- *TLA03: Students-Led Class Forum* – This is an extension of TLA02, in which selected groups of students will be responsible for leading a whole class discussion, based on a specific topic of interest. The group leading the forum is equipped with a moderator, a scribe, one to two discussants, depending on the group size, as well as a reporter or camera person to video-record the forum episodes. Typical length for this TLA03 varies ranging from 30 to 45 minutes.
- *TLA04: Online Activities* – These activities are mainly performed online with Internet access to search for materials, to identify resources, to complete assignments, to finish project and to housekeep important findings for subsequent learning, such as for TLA02, TLA03, and TLA01 (getting ready for lectures). Such activities may be performed during class hours, and/or outside of class hours.

- *TLA05: Outside Classroom Activities* – These activities are designed to enhance interaction between teacher and students, and among students themselves, such as inter-group meetings, to prepare for project work. Typically, the instructor would have several meetings with each group of PBL students to consult group work.
- *TLA06: Learning-by-Doing Activities* – These are mainly assignment or project-based work designed to integrate your skills and knowledge accrued up to a certain point of the semester learning. They include work assigned for an individual, pair-based, or teamwork completion.

Assessment Tasks (AT's)

- *AT01: In-Class Participation and Online Discussion (15%)* – Students are required to critically discuss, share, and present the assigned topics online and inside the classroom. Students may work individually, pair up, or in group as advised to participate in the discussion topics and issues. They are expected to think and learn how to engage in an exchange of ideas to construct their understanding of knowledge and not just to memorize facts, and to regurgitate the same. Students are expected to point out agreements or disagreements, to raise appropriate questions and to brainstorm solutions to problems. Extra marks are awarded to those who can draw relevant implications to apply their daily life examples. UMMoodle resources (forums, journals, wikis, and blogs) are required to track the discussion details, progress, and/or preparation.
- *AT02: Homework Exercises and Assignments (15%)* – Homework exercises and assignments are given to students to assess student understanding and knowledge on topics listed in the course schedule. As indicated in Part (A), there will be individual, pair, and team-based exercises and assignments to complete throughout the semester. All the assignments must be submitted through our UMMoodle course environment, and some must be completed directly in our UMMoodle course site, too.
- *AT03: Group Project (20%)* – This is the semester project requiring group-based collaborative work covering also both pair and individual work. It is truly a holistic exercise requiring personal responsibility, pair accountability, and team-based collaboration, in order to complete the respective portions of the same. It is an exercise designed to assess the integrative ability of the individual student, the pair, and the team as a whole, in the form of constructed responses, to be documented online through the UMMoodle environment. The assessment is composed of two parts: a) instructor assessment, and b) peer assessment, based on the artifacts produced (findings, report, presentation, digital story) and made available online in the UMMoodle course site.
- *AT04: Reading and Collaborative Learning Efforts (15%)* – The assessment of reading and collaborative learning efforts is done on a per exercise basis. Essentially, all the class work (in-class participation and discussion) and homework assignments are done or submitted through the UMMoodle course site. In regard to how excellently and consistently such work have been completed, the AT04 score will be assigned accordingly based on the assessment requirement to be elaborated on each exercise.
- *AT05: Mid-Term Test (15%)* – This test is scheduled during a 90-minute class, lasting for about 80 minutes. It is to be written on the UMMoodle course site, designed to measure the students' grasp of the key concepts and knowledge elaborated throughout the first half of the semester.

- *AT06: Final Examination (20%)* – The final exam is a three-hour in-class examination to be written on the UMMoodle environment. It comprises essay-type questions, and students are required to provide constructed responses, mostly based on some mini-case studies.

Assessment Rubrics (AR's)

TBA – The current set of rubrics is being refined and to be released the first week of the semester when this course is delivered