IRLS672 Introduction to Applied Technology

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COURSE NAME, NUMBER AND PREREQUISITES:

IRLS 672 - Introduction to Applied Technology

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There are no formal prerequisites for this course, however you should be familiar with the World Wide Web, basic technology and personal computers. Students taking this course for credit in the master's program must have successfully completed IRLS504 prior to registering for this course. Students enrolled only in the DigIn certificate program are exempt from this requirement.

Students are expected to have experience in at least one of the four professions: libraries, archives, records management, or information technology. This is a hands-on course in applied technology as it applies to digital collections of all kinds including digital libraries, archives and other digital repositories. Over the next several weeks, you will download and install programs and updates, configure hardware and software, create simple Web pages and learn how to manage software environments that may be unfamiliar to you. You should be reasonably proficient at finding resources on the Web and performing routine tasks using word processors and spreadsheets. You should feel comfortable with your current operating system (e.g. Windows or Mac OS) and know how to create and organize files and folders, install and configure peripherals such as printers and other hardware devices, and do basic troubleshooting when problems occur.

For students pursuing the SIRLS Certificate in Digital Information Management (DigIn), this is the first required course and is a prerequisite for other certificate classes that follow.

Note: This course requires access to a computer and Internet connectivity with specifications above and beyond the minimum requirements for most SIRLS courses. This course cannot be completed using open access computers (e.g. library computers or other public computers). Additionally, attempting the course on a work computer is strongly discouraged due to technical barriers frequently encountered in the workplace and problems associated with computer and network administration outside the control of the student. Read the technical requirements section below to assure that you have or will acquire the necessary hardware, software and connectivity prior to registering for the course. If you have questions about technical requirements, contact the instructor.

COURSE DESCRIPTION:

Introduction to Applied Technology is a virtual course taken on-line. Once you have registered for the course, you will be provided with a URL and login information.

Note: This course spans regularly scheduled UA summer sessions. For summer 2009, the course will run from the first day of pre-session, May 18, through the last day of summer II, August 12.

This course provides you with a basic understanding of technology in the digital information environment along with an introduction to practical hands-on skills needed to manage digital information. The course combines reading, discussion, collaboration, project work, independent study, and guided hands-on practice in order to prepare you for success in the advanced courses that follow, and in your career upon completion of the certificate.

We will cover basic installation, setup and maintenance of key systems found in the digital information environment today. We will use the open source Linux operating system as a foundation for your learning, drawing parallels to the Windows server operating system, Unix operating systems, and other operating systems as we go. Linux is a freely available version
of the Unix family of operating systems that runs the majority of web servers and database systems in use today. Linux/Unix variants and Windows Servers account for 98% of the network operating systems currently deployed. In most large institutions and businesses, both Linux/Unix and Windows servers are used. Although Apple Mac servers comprise a relatively small percentage of the network servers in use, its current operating system, OS-X, is heavily based on Unix. We will use Linux as a means to understand the different kinds of servers used to manage digital collections, how servers connect to the Internet and the World Wide Web, how digital information is managed in databases, and how scripting connects the information in databases to dynamic web pages for search, discovery and retrieval.

The specific computer architecture we will explore is known as LAMP, an acronym for Linux (the operating system), Apache (the web server), MySQL (an open source relational database) and PHP (a common scripting language used to create dynamic web pages). What you learn in this course will carry over to other operating and data systems. These core component classes, in one form or another, comprise the basis for managing virtually all collections of digital information.

You will install LAMP components on your own computer using virtualization technologies or optionally on an inexpensive computer you may acquire (see Technology Requirements below), and you will learn how the components interact. The LAMP server environment you create will be used to help you begin to create your electronic Portfolio, a requirement of the capstone course and completion of the DigIn certificate. In the advanced courses, you will install specific application software that uses the LAMP components to manage digital collections such as digital library software.

As we explore the LAMP architecture, we will also introduce basic concepts of TCP/IP (the underpinnings of the Internet and networking today), HTML markup for creating Web pages, and XML, the markup language used to exchange structured data among computers. We will call attention to software applications that are used to manage digital information collections today and discuss how the applications are integrated in a networked environment.

You will also be introduced to basic concepts of technology planning, project management and the networked information environment, especially as they apply in libraries and cultural heritage organizations.

This course is not a course in network administration, web development or programming! It is, first and foremost, a class about server technology supporting digital collections in libraries, archives, cultural heritage organizations and other institutions. We will introduce you to applied technology in order to help assure that when you finish, you will understand how to work with these technologies as an information professional such as a librarian, archivist, records specialist or other information professional. You will gain confidence in your ability to learn new technologies as they are developed and you will develop a systematic approach to problem solving and troubleshooting. You will understand basic information management architecture and be able to work with IT professionals such as programmers and system administrators to solve problems and support collections of digital information. Upon completion, you should feel comfortable working in a technology-rich environment. This course is introductory in nature and will set the stage for further exploration, formal learning and other career development according to the career path you choose to follow.

The course will follow the general schedule of topics described below. Students are asked to remain flexible; overall pacing and coverage may be adjusted to accommodate the mix of existing skills and knowledge among student cohorts.

1. Servers and Operating Systems
2. Linux 1 Topics (the command line interface) (Windows Server 2003; OSX)
3. Linux 2 Topics (configuration basics)
4. Linux 3 Topics (users, groups and permissions)
5. The Networked Environment Topics (TCP/IP, Protocols and Addressing)
6. Web servers - Apache 1 Topics (HTML) (MS PWS, MS IIS)
7. Web servers - Apache 2 Topics (Beyond HTML)
8. Technology Planning / Technology Plans / Acquiring Technology
9. Relational Databases 1 - Topics (ERD, Normalization)
10. Relational Databases 2 - Topics (SQL) MySQL
11. Project Management / Managing Technology
12. Scripting - PHP (Perl, Java, CGI, .NET)
COURSE OBJECTIVES:

By the end of this course, you will understand and be able to describe:

- TCP/IP fundamentals including the major components and protocols of the Internet and networking and their appropriate use;
- The functions and component parts of an operating system, a web server, a database, and a scripting language
- Simple setup and maintenance of LAMP components
- Linux shell commands, the Linux directory structure, shell scripts, and editing of configuration files
- Relational databases and basic principles of database design
- Basic markup including HTML, XML and XML-Schema
- The pros and cons of open source and propriety software
- The pros and cons of command line interfaces and graphical user interfaces
- Approaches, methods and resources for problem-solving and troubleshooting
- Elements of a technology plan and the technology planning process
- Major funding for technology in libraries and cultural heritage organizations including eRate, LSTA and other grant opportunities
- Project management fundamentals
- The use of LAMP and similar architectures in digital libraries, archives and other digital collections

By the end of this course, you will be able to:

- Download, install, update and patch Linux and LAMP software distributions
- Configure and secure basic LAMP components
- Create simple databases and execute database queries
- Modify configuration files using both command line and graphic editors
- Create simple scripts, web files, SQL queries and XML documents.
- Plan, deploy and manage technology projects

REQUIRED COURSE MATERIALS:

Textbooks and Application Software

Nemeth, Snyder and Hein (2006). Linux Administration Handbook (second edition). Prentice Hall PTR. ISBN 0131480049. The first edition is also fine if you have it or find a used copy. This text is optional. It is recommended primarily for those who desire a more advanced reference in print format and who plan on future work involving linux or unix environments. Selected readings will be posted in eReserves, so purchase is not required.

We will use virtualization software to conduct hands-on assignments. If your primary computer system is a Mac, you may need to purchase a copy of the software application VMWare Fusion. Check with the instructor to determine the correct version for your model and processor. For the Windows/PC platform, VMWare Server is freely available. Student licenses for VMWare Workstation for the PC may be made available at no cost. Update 4/26/09: At this time, we expect to be able to provide trial student licenses for VMWare workstation (PC) and Fusion (Mac) at no cost. Please consult with the
instructor before purchasing or installing anything. Final instructions will be provided on the first day of class.

All other required readings and study materials will be freely available on the Web, available through the UA Computer Based Training website (UA NetID required, see http://uacbt.arizona.edu) or placed in the University of Arizona electronic reserves system.

Optional readings, useful books and supplementary or optional software will be suggested as the course progresses.

Technology Requirements - Primary Computer

You will need at least one computer and a couple of accessories for this course. Read the following section carefully to see what you need to acquire and what you probably already have. Although you may need to purchase some hardware, the cost should not be burdensome or significantly more than you might expect to spend on books and course packs for traditional graduate professional courses. At least two weeks prior to the start of the course, you should contact the instructor and provide a list of the equipment you propose to use. As a matter of policy, we do not recommend particular brands, and a wide variety of equipment will be satisfactory. If you have questions about any particular item, especially ones you might need to purchase, your instructor will be happy to review your selections and suggest options.

The first computer you need will be the computer you probably already have. We'll call this your host computer. It may be either a Windows machine (Windows XP or Vista) or an Intel-based Mac (OS-X ). Older versions of the Mac running the PowerPC chip will not work nor will older versions of the Windows operating system. The software we will use won’t run on older versions of these platforms. This computer must be reliable. We will install virtualization software on it that will allow you to create one or more virtual computers running the Linux operating system, so you must have administrator rights on your computer. You should already have or be able to install plug-ins such as Flash and Java. You’ll also need recent versions of Internet Explorer, Firefox or Safari as your web browser.

Because many of the resources we will use are large (up to 1GB downloads, and more in some cases), you MUST HAVE reliable BROADBAND connectivity to your Internet service provider. Most cable or DSL connections will be adequate. Download speeds of one megabit or more are preferred. Slower connections will lengthen the time it takes to acquire the necessary files. Standard telephone-based modem connectivity will not be a practical way to acquire the necessary files.

You will need adequate disk space to install some new software on your production computer. If you don’t have at least 20GB of free disk space, you may need to consider acquiring a second hard drive, either internal or USB external. You should also have adequate RAM to run multiple programs. You will need a minimum of 1GB RAM for Mac and Windows XP systems, and 2GB RAM for Windows Vista systems. Depending on individual configurations, you may need to install more than these minimums.

Technology Requirements - Optional practice computer

You may OPTIONALLY elect to acquire a second computer to install a working copy of Linux and other software that comprises the LAMP server. Many students find that working with a second practice computer enhances the hands-on learning experience. However, you ARE NOT REQUIRED to have a practice computer. This computer should be an inexpensive, basic model. Linux will run on most bare-bones systems. It is very likely you have an old computer in the garage (the one you had before you got the one you have now), or perhaps you have a friend with an old computer you can use. If you choose to buy one, you should not expect to spend a lot of money. Used computers suitable for this purpose are almost always available on eBay and other outlets for as little as $100 - $200. You may have a recycling center in your community that sells refurbished donated computers for under $100. A good configuration for this computer might be:

- Intel Pentium 4 or equivalent AMD processor (earlier Pentiums or Intel 386/486 are not recommended)
- 256MB memory (128MB minimum)
- 20 GB hard drive
- Ethernet 10/100 network card
- Bootable CD-RW drive

In general, you’ll want to avoid anything that is really new or proprietary. It takes a while for the Linux community to
develop hardware drivers (we’ll learn about those in the course), so new products and peripherals aren’t always supported right away on Linux. Other problem areas for Linux installations are wireless network cards, high end video cards and newer laptops. Plain vanilla is best and cheapest.

If you do choose to acquire a second computer, you probably won’t need a second monitor. You may purchase a KVM (keyboard, video and mouse) switch that will allow you to connect your main computer and your optional second computer to your existing monitor, keyboard and mouse. You simply toggle a button to switch back and forth between the two computers. There are different models depending on whether your keyboard and mouse have PS2 or USB connections.

Technology Requirements - Home Networking

The last thing you’ll need is an inexpensive home router available from any consumer electronics superstore. You probably already have one if you have wireless networking and/or multiple computers set up at your home. The router connects to your existing cable or DSL modem and allows multiple computers to access the same Internet connection as well as communicate with each other. Both your host computer and your optional second computer need to connect to the Internet. Wireless routers also have regular wired Ethernet connections, so you don’t need to purchase wireless Ethernet devices. In fact, your optional second computer will be easier to set up with a standard wired connection and a plain vanilla Ethernet card. The two most common types of wireless routers in stores today comply with variations of either the 802.11g or 802.11n specification. The 802.11n models are faster in wireless mode and more expensive. 802.11g will work quite satisfactorily. If you already have an older 802.11b router, that will also work.

We will cover how to set all this up in class.

COURSE REQUIREMENTS:

Email is the SIRLS’ official means of communication with all students. SIRLS requires that you provide an email address at the time of admissions. The University and School policy require that students obtain a NetID and a university email account.

See https://netid.ccit.arizona.edu/newid.php.

The university and the school communicate with students through this email account, and failure to use it regularly or forward it to an often-used account will result in missing communication essential to the progress of the certificate. In addition, students are signed on to the school's official communication listserv, IRLSadmin. It is the student's responsibility to receive messages sent to IRLSadmin and to the student's university email account.

Proficiency with Technology

We recognize that students entering the certificate program will have a range of existing technical skills depending on their background and previous professional experience. For many students, most of the material will be both new and interesting. Every effort will be made to provide adequate technical support necessary to assure success. The course only requires that students come in with a reasonable facility with personal computers and a strong desire and commitment to broaden their technological horizons.

On the other hand, students with strong technical backgrounds may find some or many of the exercises already familiar. Although course waivers will be considered only in exceptional circumstances of extensive professional accomplishment, students with more advanced technical skills who are already proficient with aspects of the hands on portions of the course may propose, with the approval of the instructor, more advanced work in order to improve their knowledge and skills. The instructor may also suggest options throughout the course that technically advanced students may consider in order to maximize the learning experience.

Commitment of Time

This is an intensive hands-on technology course taken over a compressed summer schedule, and most students who have taken it report spending more time in completion of the required materials than other graduate courses they have taken. Students are advised to take this into account as they make their summer plans.
COURSE, SCHOOL, AND UNIVERSITY POLICIES:

Academic Code of Integrity

Students are expected to abide by The University of Arizona Code of Academic Integrity. 'The guiding principle of academic integrity is that a student's submitted work must be the student's own.' If you have any questions regarding what is acceptable practice under this Code, please ask an Instructor.

Accommodating Disabilities

The University has a Disability Resource Center. If you anticipate the need for reasonable accommodations to meet the requirements of this course, you must register with the Disability Resource Center and request that the DRC send me, the Instructor, official notification of your accommodation needs as soon as possible. Please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

Assignment Policies

All assignments are due on the day and time indicated. Late assignments will not be accepted without a grade penalty except in documented extreme cases involving circumstances beyond the student's control. Late assignments may be penalized one or more full letter grades at the instructor's discretion.

Writing Guidelines

Norms of graduate level writing including appropriate organization, level of expression, use of standard grammar and spelling, and citation of resources are expected in this class. All graded assignments include elements of writing competence. The existence of problems will be indicated, but the instructors will not edit the student's work. Students who want more detail about the kinds of errors they are making should consult the instructor. Help in improving writing is available through the Writing Center http://web.arizona.edu/~uawc/. The following Web sites offer excellent advice as well.

- The OWL at Purdue University: http://owl.english.purdue.edu/
- Chuck Guilford, Paradigm Online Writing Assistant: http://www.powa.org/

Incompletes

This course and the companion course Introduction to Digital Collections are the foundation for success in advanced coursework in digital information management. It is in your best interest to complete this course on schedule. Incompletes will not be given except in documented extreme cases involving circumstances beyond the student's control. Certificate student should note that any incomplete in Introduction to Applied Technology must be removed before the student continues in the certificate program.

Incompletes are strongly discouraged. See the Graduate College website for the official University Policy on Incompletes and note especially the following: The grade of I may be awarded only at the end of a semester, when all but a minor portion of the course work has been satisfactorily completed. The grade of I is not to be awarded when the student is expected to repeat the course; in such a case the grade of E must be assigned. Students should make arrangements with the instructor to receive an incomplete grade before the end of the semester ... If the incomplete is not removed by the instructor within one year the I grade will revert to a failing grade.

GRADING:

This course will use an online learning management system as the primary means of instruction. Modules will be posted to the system each week consisting of special lectures, discussion boards, assignments, quizzes, and links to resources and readings. You are also expected to maintain a blog.

This is not a self-paced course. You are expected to keep up and progress as a group. This is important because you and
your fellow students will be an important resource for troubleshooting and problem solving. You should count on checking into the course management system at least five days each week to keep up with announcements, discussions and assignments. The course is, however, conducted asynchronously, so you do not need to check in at any specific time. During the course, opportunities for optional participation in webcasts or other kinds of synchronous learning that occur at specific dates or times may be announced as they become available.

Grading is based on the following elements:

- Class participation, 10%, 100 points
- Weekly assignments, 25%, 250 points
- Individual Blog, 20%, 200 points
- LAMP Project / ePortfolio Presentation, 30%, 300 points
- Final Exam, 15%, 150 points
- Course Total 1000 points

**Class Participation Grade – 100 Points**

Your class participation grade is a measure of your participation in class discussions and weekly quizzes. Each week, one or more topics for online discussion will be posted, usually based on assigned readings. You are expected to contribute substantively to the discussions and to be helpful to your fellow students. As a rule of thumb, a good post is at least 100 words and addresses issues raised by the topic.

Good responses to posts are at least 25 words and consist of more than simple acknowledgement of agreement or disagreement. You should expect to provide at least one post and two responses to the posts of your fellow students each week that meet these guidelines. You may also provide shorter posts, nods of agreement and those other things that make discussions interesting, but your grade will reflect the content your substantive posts and responses. Good writing practices are expected.

It is perfectly acceptable to disagree with opinions expressed in the posts of your instructor or fellow students, but you are expected to demonstrate professionalism and respect at all times. Personal attacks, flames, and lack of respect will not be tolerated in the discussion boards.

There will also be a short true-false multiple choice quiz posted each week covering terms and concepts introduced in the lecture or reading. Their primary purpose is to help reinforce key words, acronyms and important ideas. The quizzes themselves will not be graded and you may take them as many times as you like. However, you must take them. If you don’t take the weekly quiz each week, it will adversely impact your class participation grade.

Class Participation Grading Scale:

90%-100% - A – Weekly posts and responses are frequent, well articulated, timely and responsive; all quizzes completed on time each week.

80%-89% - B – Weekly posts are less frequent, substantive posts are not provided each and every week or are provided late, some quizzes not completed or completed late.

70%-79% - C – Few posts made; weekly quizzes sporadic, late or not taken at all.

**Weekly Assignments – 250 Points**

Each week, one or more assignments will be posted for completion. The assignments will consist primarily of specific tasks relating to the hands-on activities you are expected to perform on your LAMP installation. You may also be assigned to research topics on the Web and elsewhere and provide short summaries of your findings. Evidence of completion of the tasks will take the form of system logs or answers to specific questions relating to expected outcomes of the assignment.
The documentation or required summaries must be submitted to the eCollege drop box by the time and date indicated.

Weekly Assignment Grading Scale:

90%-100% - A – All assignments completed on time. Where applicable, the writing is clear, concise and relatively free of grammatical and spelling errors. Evidence is provided that the hands-on portions of the assignment were completed and documented.

80%-89% - B – Some assignments are posted late, or are incomplete, or demonstrate flaws in writing such as poor grammar or spelling. Some hands-on activities are not completed.

70%-79% - C – Few assignments are completed in a timely fashion, or are of overall poor quality or are incomplete.

Individual Blog – 200 points

Each of you will make weekly entries in a blog. Access to a blog will be provided or you may select the blog host of choice. The blog is intended to be a weekly diary of your activities. You may include documentation of installation or configuration details, outside resources reviewed or evaluated, interesting articles or web sites, comments on relevant blogs, or other progress on your ePortfolio. Entries should be made every week. A good rule of thumb for length is 250-450 words weekly, or about ½ to 1 standard page. You are encouraged to read the blogs of your fellow students and comment if and as appropriate.

Blog Grading Scale:

90%-100% - A – The blog is updated at least weekly. Postings are responsive, articulate and topical. Postings or edits to the Wiki are frequent and responsive.

80%-89% - B – The blog is not always updated weekly, or some posts are lacking in clarity, topicality or relevance. Posting or edits to the Wiki are less frequent or less substantive.

70%-79% - C – The blog is rarely updated, or entries demonstrate poor writing, lack of clarity, or are largely irrelevant. There are few postings or edits to the Wiki.

LAMP Project / EPortfolio Presentation – 300 points

Each of you will be responsible for a short presentation due one week before the end of class describing your LAMP project and environment. The resulting presentation will be the first artifact comprising the ePortfolio you will develop as you work through the certificate program. The presentation may be in the form of an annotated PowerPoint, voice over PowerPoint, or standard term paper. You should describe your overall progress in building the LAMP server, the major hurdles you faced, lessons learned and current status of the system. The presentation should be developed so that if presented live, it would last approximately 10 minutes. Note that your LAMP system does not need to be entirely complete or 100% functional as long as you have adequately documented problems and the efforts you have made to resolve problems or technical barriers. During the last week of class, you will review your fellow students’ presentations and discuss them in an online discussion board.

LAMP Presentation Grading Scale:

90%-100% - A – The presentation adequately describes the current status of your LAMP server project and addresses the issues raised in the assignment in the time frame suggested. Composition and grammar meet graduate level writing expectations.

80%-89% - B – The presentation is lacking detail, or does not included all the suggested elements, or is somewhat shorter than the suggested length, or demonstrates flaws in composition or grammar.

70%-79% - C – The presentation is fundamentally non-responsive, or demonstrates lack of understanding of the LAMP architecture, or completely fails to address many of the suggested elements.

Final Exam – 150 points
The final exam will consist of true-false and multiple choice questions drawn from the quiz bank (75 points) and a short essay reflecting your vision of technology and its role in the digital information environment (75 points). Additional details on the essay question will be provided prior the exam.

**Course Grade**

90% - 100%, 900-1000 points, A  
80% - 89%, 800-899 points, B  
70% - 79%, 700-799 points, C

**INSTRUCTOR NAME AND CONTACT ADDRESSES:**

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Summer 09
- IRLS515-001 Organization of Information
- IRLS520 Ethics for Library and Information Professionals
- IRLS521-001 Children's and Young Adult Literature in a Multicultural Society
- IRLS540 - Introduction to Archives
- IRLS541-001 Preservation
- IRLS560 Information Resource Development
- IRLS564 The Organization and Administration of a Corporate Library
- IRLS571-001 Introduction to Information Technology (Smith)
- IRLS582: Young Adults and Public Libraries
- IRLS588-001 - Issues in Information Resources: Health Information in Ethnic-Cultural Communities and Environments
- IRLS608 Planning and Evaluation of Libraries and Information Centers
- IRLS651 Information Policy & Cultural Perspectives
- IRLS672 Introduction to Applied Technology
- IRLS688 Marketing Library and Information Services to Communities

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Course
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- IRLS418 (1)
- IRLS432 (1)
- IRLS470 (2)
- IRLS488 (6)