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Abstract

The terminology of engineering is daunting to the novice librarian without any science background. Library information school (LIS) students without training in scientific disciplines express concerns about pursuing a career in engineering librarianship. Why don't they get onto the science/technology (sci/tech) bandwagon? What information and inspiration are necessary to sail toward the science and engineering horizons of our profession? A successful transition from graduate student to practicing engineering librarian requires a complex combination of knowledge and skills. The support and assistance of colleagues is critical and the establishment of support groups for various research needs can provide a mechanism for discussing common concerns. The author will discuss strategies to encourage science, engineering, and library students to pursue careers in science/engineering libraries and highlight ideas on recruitment and retention of new science and technology librarians.

Introduction

"To ask why we need libraries at all, when there is so much information available elsewhere, is about as sensible as asking if roadmaps are necessary now that there are so very many roads."
~**Jon Bing**, Professor of Information Technology Law, University of Oslo, Norway

We are at crossroads. We, the science and technology (sci/tech) librarians, are facing multiple challenges to maintaining a thriving profession into the future. There are many roads on the professional map in front of us leading in different directions: learning new and evolving technology, discovering new channels for scholarly communication, transforming the information resources from analog to digital media, trying to instruct our users collaboratively, etc. Yet critical questions remain if we are

confident to navigate our path. Is this map available to the public? Do we have followers to undertake what our predecessors have built?

Engineering libraries began to flourish before 1910 as academic departmental libraries across the United States (Neeley 2008). Currently, there are more than 150 engineering branch libraries across the United States (University of Illinois at Urbana-Champaign). Recent budget cuts have forced some to close. The lack of interest among library school students to undertake a career as academic sci/tech librarians is a concern. Together, these facts are alarming for the future of our profession and are discussed at library and engineering conferences and on listservs.

Dilemma: Dual Masters Requirement (Subject Degree plus Library Degree)

There is an ongoing debate in the literature whether it is necessary for sci/tech librarians to have a scientific disciplinary background as well as firm grounding in the use and design of relevant information resources of individual sci/tech disciplines. While this combination of disciplinary education and knowledge is helpful, and by and large expected at most academic engineering libraries, I will argue in this paper that these requirements should be changed. To deal with the challenges associated with recruiting sci/tech librarians, some universities don't even require MLS/MLIS/MIS degree when announcing available library positions. In order to recruit more appropriate candidates, some universities no longer require a terminal degree in library science, preferring to open the candidate pool to those firmly based in the sci/tech disciplinary training.

Does this indicate an accepted failure of library science education? Are Library Information Schools (LIS) successfully training confident, adaptable and knowledgeable information specialists to sci/tech librarianship? Is the educational training and the applied practice in step with each other for preparing future professionals who can adequately and appropriately serve the sci/tech clientele? Is it necessary to have a combination of science background and library degree to serve the sci/tech academic community? What recruiting obstacles are there with this requirement? What further education upon appointment is needed by new sci/tech librarians to be successful?

Many physical sciences librarians may retire soon, as the "graying of the library profession" becomes a reality, highlighting the need for recruiting sci/tech librarians. A decline in the recruitment efforts for sci/tech librarians in the recent years was discussed on the Engineering Libraries Division (ELD) listserv (2009). Many suggestions and opinions were expressed. For instance, if the library degree is no longer required, what effect does that have on the marketability of library professionals? Furthermore, what qualifications, skills, or degrees are expected of

candidates? And once hired, what is the process for acculturation to the library profession? On the other hand, if a library degree remains a requirement, can an individual feasibly become a successful sci/tech information professional without an accompanying science background?

By examining the core competencies for sci/tech librarianship, this article attempts to identify the relative importance of each educational requirement (scientific disciplinary background and terminal library degree) that shapes the successful sci/tech librarian. It reviews the literature related to graduate library school preparation for sci/tech librarianship and presents relevant experiences of recent graduates at the Engineering and Physical Sciences Library (EPSL), University of Maryland (UMD), and their first encounter with the profession. It also discusses recruitment strategies for library managers based upon relevant experience at the University of Maryland and other academic institutions, while providing practical advice for continuing education of sci/tech librarians. Topics include adapting to a new environment, on the job training, liaison work, and time management.

Literature Review

When reviewing the appropriate topical literature, three areas must be discussed. The areas include: the existing information available about "Science and Technology Resources and Services" courses offered in library and information science graduate programs; an assessment of the skills science/engineering library recruiters expect new graduates to possess; and finally, recruitment strategies including assistance or training available to new graduates upon appointment.

The relevance of the MLIS degree is an ongoing debate in academic sci/tech library communities. Lillard and Wales (2003) suggest different strategies for strengthening the library profession such as team teaching and participating in joint research projects between LIS, sci/tech libraries and library associations. The transition from graduate school to a professional academic library position is a challenging one, especially when facing the initial journey into science and technology fields. Many librarians experience the stress of this move because in most instances recent graduates do not have the necessary skills, simply due to the lack of applied experience and education. The terminology of engineering is sufficiently off-putting to the novice librarian who lacks a science background. Library information school students without science background often express insurmountable fears and concerns in pursuing a career in engineering librarianship. On the one hand, LIS programs can hardly be expected to provide students comprehensive preparation in the manifold skills of librarianship (Tucker & Sinha 2006). On the other hand, it may be that neither LIS programs nor libraries are doing as much as they can to deal effectively with our current "tremendous educational ferment," which finds the dual challenge of LIS programs

lacking a well-defined core curriculum in engineering reference and engineering libraries lacking equally well-defined core services (Mulvaney & O'Connor 2006).

Still, the deficiencies of science and technology courses cannot be entirely blamed on graduate library science curriculum. The science and technology course often strives to teach basic elements of knowledge of information resources in the field. Unfortunately, one course cannot possibly discuss every aspect of sci/tech librarianship in minute detail. Science and technology courses cover the major areas of information resources in the physical sciences and best practices for searching, but in depth applied disciplinary knowledge cannot be covered. It is impossible to teach in a limited number of elective credits the breadth of knowledge required to gain a general science and technology subject expertise. Kuruppu (2007) examined several surveys conducted at colleges and universities and reported that a high percentage of sci/tech librarians had at least undergraduate science degrees. These findings indicate that many librarians with science background are currently in the field of sci/tech librarianship. However, Kuruppu concluded: "[…] it appears that without a concerted, extraordinary effort to recruit more subject specialists into the profession of sci/tech librarianship, only slightly more than half of the librarians will have science or technology education or training." The lowest percentage of science librarians with academic background in physical sciences was recorded by Winston (2001) and the highest representation came from chemistry librarians (Hooper-Lane 1999). Actually, the library education in chemistry information specialization remains very strong. For example, the School for Library and Information Science at the Indiana University has implemented a collaborative program between the library school and the Chemistry department to prepare information specialists with chemistry majors.

The most recent research was presented at the Annual Library Conference (ALA) in 2005 by Mel DeSart, Head of the Engineering Library at the University of Washington. DeSart told of engineering students of many years ago who managed to graduate without ever setting foot in the libraries. Again, in this digital era, because they can access published scholarly content online, there are still students who never set foot in libraries. He concluded: "[…] interestingly, we [sci/tech librarians] are a substantial portion of the reason why those users don't need to ever use our physical facilities, since it's via our efforts that those users have access to so much content without the need to enter our buildings."(DeSart 2005). The literature confirms that those efforts will only increase in the future requiring from the next generation of sci/tech librarians to possess a new set of skills and knowledge (Jones 2009, Kuruppu 2007, MacKellar 2008, Matthews & Pardue 2009).

In her discussion of the value of having a science background, Kuruppu (2007) examined views of the proponents of a strong science background versus those of hiring "generalists." This debate is ongoing and although it is true that the complexity

of the information environment has created a need for librarians to not only apply sophisticated search techniques and retrieve complex scientific data, but also to understand its content and applications, the advent of the technology nowadays requires new set of skills. Library users freely navigate the Internet but they still lack information literacy skills. “We too have disciplinary expertise!” Gregory (2005) attracted faculty’s and students’ attention to the academic subject librarians. She argued the importance of emphasizing our professional strengths as information specialists rather than subject expertise because it is assumed that it will definitely be fewer sci/tech library experts compared to the researchers in the science fields. This library disciplinary expertise includes “information literacy, the organization of access to resources, the dissemination of knowledge, and facilitating users’ connection to key scholarly conversations.”

MacKellar (2008) brought another interesting perspective to this discussion: the accidental librarian. Sci/tech librarians without a science background can learn valuable lessons from her book “The Accidental Librarian.” Having a strong foundation of library knowledge from library school, sci/tech librarians, similar to the “accidental librarian,” could grasp the applied disciplinary knowledge while on the job. In support of this situation comes Angell (2009) who argues that the financial and time costs to pursue two degrees may not add sufficient value because a science background is not strongly required in hiring sci/tech librarians. Angell attributed this fall in requiring second degree to the variation in the core skills new sci/tech librarians are expected to bring. The investigation of the core competencies from various resources (ALA 2009, ASERL 2000, SLA 2003, Tompson 2007, Tucker & Sinha 2006, Beck & Callison 2007) showed a consistent trend in defining the necessary skills and knowledge a sci/tech librarian should acquire for the 21st century.

The professional competencies are:

- Developing and managing information services
- Managing information resources
- Understanding the library as an information organization and supporting cooperation and collaboration
- Applying information tools and technologies

The personal competencies outlined in the above-mentioned documents are:

- Intellectual curiosity
- Strong communication
- Flexibility
- Positive mind
- Adaptability

Directly to this point, the 1996 Special Library Association (SLA) professional competency "[a] special librarian has specialized subject knowledge appropriate to the business of the organization", has been dropped in 2003 revised edition. This supports the shared vision expressed at the Academic Research Libraries (ARL)-Coalition for Networked Information (CNI) forum on "Reinventing Science Librarianship: Models for the Future," held on October 2008 in Arlington, Virginia. Adaptability, flexibility, "focus on strategies for library service assessment, evaluation and improvement," "skills related to organizing and manipulating data and data sets," "skills to negotiate between different data systems and between different sorts and compilations of data sets," and the ability "to play mediating and facilitating roles within and between [virtual] communities [of researchers]" were presented by Jones (2009) as the new set of knowledge and skills necessary for research subject librarians to be effective information professionals along with the evolving technology and constant transformation of science. It is assumed that the future offers a challenging technological environment to the upcoming sci/tech librarians.

In addition to the ARL-CNI set of skills, the newly hired sci/tech librarians will need to continue their education while on the job. The Science Technology Section (STS) Continuing Education surveys from years 2001, 2003, 2005 and 2007 showed an emerging trend of continuing education needs. Teaching science information literacy using a variety of instructional techniques and technologies, and learning new electronic resources will be necessary (Desai 2002). An improved liaison relationship with science departments is indicated (Christianson 2004). Learning new technologies will be ever-present (Spackman et al. 2006). And there will remain a sustained need for learning best practices in collaboration between faculty and librarian, along with evaluating existing services and developing new ones (Calzonetti & Crook 2009).

Library recruiters have several pools of candidates to fill sci/tech librarian vacancies:

- Undergraduate science/engineering students who are not interested in laboratory work but love their field (Beaubien 2007, Eells 2007).
- Library school students
- Paraprofessional staff (Eells 2007)
- Science researchers in the industry looking for a career change (Beaubien 2007, Brown 2007, Eells 2007).

Different authors suggest a variety of strategies and tips for recruiting potential candidates for the sci/tech library profession. Recruiters can communicate with possible candidates the attractiveness of our profession and emphasize its many areas of applications area: public service, collection development, and collaborative instruction. Other suggestions include:

- Intentional cooperation between university libraries and library school educators to provide students hands on training (Lillard & Wales 2003).
- Update job descriptions for sci/tech librarians and "emphasize technology, scholarly communication, digital transformation of key source material, and instructional collaboration" (Beaubien 2007).
- Remove the scientific background from the job announcements for sci/tech librarians (Brown 2007).
- Recruiting students starting from high school and undergraduate programs. Be a role model to students you supervise (Beaubien 2007, Jeong 2007, Pellack 2007). Show them relevant resources on career options. One successful approach is shown on the *American Chemical Society's* web site describing "Chemical Information Specialists" careers.

Recruitment of Science and Technology Librarians at the University of Maryland and Best Practices at Other Academic Institutions

Recommendations for Library Schools

I attended Mel DeSart's ALA conference presentation (2005) where he provided statistics on 2005 LIS course offering. I have followed the same methodology to find whether the situation has changed since then. The catalogs of all ALA-accredited library schools were surveyed to identify which listed science and technology courses. Secondarily, over one academic year, the semester schedules of those schools were reviewed to identify the frequency of course offering. Lastly, beyond the DeSart study, I identified dual degree programs offered by the same institutions and determined the percentage of existing sci/tech dual degrees.

The findings are illustrated in Table 1 and in the Appendix.

	2005 DeSart's findings	**2009 Tchangalova's findings**
ALA-accredited programs	56	57
Conditionally accredited	3	4
Excluded	Montreal	None
Sci/tech course listing	41 programs (74.5%)	42 programs (73.7%)
Offerings within one-year period from universities offering sci/tech courses	15 (36.5%)	25 (59.5%)
Dual degree offerings in all subjects	N/A	27 (47.3%)

Dual degrees offering in sci/tech only from universities offering dual degrees	N/A	6 (22.2%)

Table 1. Science/technology courses and dual degree offerings at ALA-accredited library schools

There has been a small shift the past four years. Only 27% in 2005 and 44% in 2009 of *all* ALA-accredited LIS programs could a student interested in a sci/tech focus be able to take a sci/tech course during a one-year period in that program. Many LIS programs are one-year full-time programs. Thus only 1 in 4 in 2005 or 1 in 3 in 2009 of the ALA-accredited LIS programs could a full-time student expect to have even the opportunity to take a sci/tech course from the point they entered the program until they graduated. The ratio will drop lower if these courses are cancelled due to lack of minimum enrollment. This means that a very large percentage of LIS students never have the opportunity to take a sci/tech course during their studies in a given LIS program, even if they had the interest. Furthermore, only 11% of *all* ALA-accredited LIS programs offer dual degree programs in the sciences. This further limits the number of library students who have the opportunity to explore sci/tech specialization.

From many conversations with colleagues, library professionals and in the literature (Bosque & Lampert 2009), it is evident that today's library schools need to update their curriculum and equip graduates with a new set of skills and knowledge for the 21st century library jobs. Even more, from my personal experience and this of other new librarians I talked with at different library events, if they come to the academic environment and have to meet the tenure requirements, they come out unprepared to do any kind of research due to lack of educational training in research methodology while in library school. If they don't understand the focus of what the libraries are doing, I would argue that at least they must get a 21st century understanding of what libraries do and how they do it. Our science and engineering librarians are striving to change rapidly to respond to faculty members and a student audience who insist in having access to information in a digital format and who work in a very different manner than they did 10 years ago. It is indeed difficult to create a curriculum to cover all aspects of librarianship: public, academic, and special and at the same time cultivate skills such as communication, negotiation, risk-taking, initiation, leadership, etc. For example, traditional librarians are not well suited to promote library resources and services because they struggle with various aspects of their daily job requirements. They are used to doing a bit of everything and so they do not excel in anything. They are better in "informing" about the resources and services than "selling" them. In this area for library outreach, there is a need of people with excellent communication skills and a mature confidence in them. It seems we require a hybrid "information technology (IT)" (Matthews & Pardue 2009) and "finding information" librarian kind of person. The future sci/tech librarian must be adaptable

to the changing technology conditions, tight budgets and the ever-changing institutional requirements.

Following are some best practices for producing qualified sci/tech librarians that I learned from colleagues in personal conversations at various academic institutions, library associations and training sessions:

- *Update curriculum and offer online classes*. Obviously, library schools need to redesign their curricula to include both theoretical and practical components of library science. Some universities (Emporia State University) have done quite well with this, others not. Also, introducing science librarianship skills into general coursework can spark some interest in those low-attendance science reference courses that are getting cancelled due to low numbers. Including liaison skills into the curriculum can give students an idea of how they might attack learning about a subject matter outside their educational background. Providing online courses will help to reach out students who otherwise cannot attend them due to geographical constraints (Smith 2007).

- *Offer a science and technology course along with a support in this area*. Besides offering a single course in "Information resources in science and engineering," developing a stronger program of support in this area will be more useful. Library educators could create more specialized programs by partnering with faculty in other departments. Universities offering library graduate programs could create joint degrees although it is more expensive and involve more time to complete it (Angell 2009) while at the same time subject expertise is not the most important knowledge that makes the new sci/tech librarian successful. But at least this is an option, especially for the chemistry field where the subject knowledge is sometimes helpful in decreasing the stress on the job. While some schools have already taken this progressive step – such as the joint program at the Indiana University described on its web site – a widespread collaboration and implementation is needed. This joint program could greatly help individuals wishing to become subject specialist librarians. Library schools and academic libraries must retire their outdated practices to require a dual master's degree for subject librarians. Undergraduate study in the pertinent subject, as well additional work-related experience, should be given more influence.

- *Develop internships*. Library schools could develop programs to provide coursework and internships for new sci/tech librarians. They could partner with local libraries to transfer money from lines that libraries cannot fill, due to a lack of suitable candidates or obtained funds through grants from funding agencies and foundations, to fund internships. One pool of candidates is

described by Bright et al. (2007) using grant funds from the Institute of Library and Museum Services to recruit and educate ten diverse students from minorities with strong interest to the field of science librarianship. Another similar program is the Chesapeake Information and Research Library Alliance (CIRLA) fellowship program (Alburo 2007). The program is explained in more details on its web site and offered current graduate library students professional and educational mentoring and networking with experienced librarians and library leaders from nine research libraries. As a former student from this program, I gained a valuable work experience through application of classroom learning to a hands-on practicum in a real library setting. Despite my chemical engineering background, it is this program that shaped my success as an engineering librarian. Similar experience has been described by Cecilia Brown (2007) who shares: "I discovered that it was not the doctorate nor the hundreds of hours spent in the laboratory communing with radioactivity and rats, that helped me get through that first day. Rather, it was the invaluable combination of mentoring received and experience gained at the reference desks and in the library school that gave me the courage and self-assurance (both tinged with anticipation), to come back the next day […]."

- *Coordinate tours and meetings of science libraries through the LIS student associations*. Encourage student membership participation in engineering associations such as the American Society for Engineering Education (ASEE) or Special Library Association (SLA). Both associations have reduced student membership fees and even ASEE offered no fees for early member students for their 2009 annual conference. Work with the associations in establishing scholarship programs for attracting library students into the sci/tech librarianship. SLA scholarship program is explained on SLA web site and could be used as a model to establish a scholarship specifically designed for attracting prospective sci/tech librarians.

Recommendations for Library Managers and Supervisors

- *Unpaid internship or field study.* Graduate students, who were enrolled in the class LBSC707: Field Study in Library Service (Simmons-Hodo 2007), gained hands-on experience in EPSL. Syllabus of the course is available on the iSchool's web site (University of Maryland). The enrolled students completed 100 hours of supervised library work and gained experience in an engineering library setting. The students had the opportunity to study and solve a specific problem. Partnering with the iSchool helped prospective students without "strong" science credentials move into science/engineering librarianship. One graduate was successfully placed in science librarianship at the National Institute of Standards and Technology in Maryland.

- *Paid annual graduate assistantship.* The iSchool students hired were from different science backgrounds and upon graduating they further pursued a science librarianship. The most recent graduate was hired at Towson University Library in Maryland as a science librarian responsible for various subject disciplines in physical sciences.

- *Paid hourly student assistants.* These hired iSchool staffed the reference desk for 10-15 hours a week and assisted reference librarians with various off-desk projects. Some students, upon graduating from library school, pursued further science librarianship at the National Agricultural Library in Maryland.

Every time a student leaves EPSL for any reason, I ask them by e-mail to share their positive and negative experiences while working at the library. All of them found the experience extremely valuable and this hands-on practice opened them to areas of the profession that they had not considered. I worked with a library student who had a major in art and graphic design, so the student was involved in creating new signage for the library, marketing materials and exhibits. There are many opportunities for engineering or computer science undergraduate and graduate students to work on a digitization project or a chemistry student to help out with collection development work – there are a lot of possibilities!

From my experience with hiring and overseeing students with or without sci/tech background at EPSL, I found that those library students without science backgrounds acclimated faster to the workflow than graduate students with a science major and no library degree. I spent less time in training LIS students with no sci/tech background than I spent with graduate students with sci/tech backgrounds but not library education or earlier library experience. From this experience, I conclude that the educational credentials from the library school are as important as the communicative skills and the inquisitive nature of the students. Science background by itself alone cannot give the student a life jacket to survive the choppy waters of the sci/tech library profession quickly. I conclude that having a strong theoretical foundation in library science, from sophisticated search techniques to how to deal with various research communities, will solve the dilemma whether to require a dual degree or not: if one has a library degree, filling the gaps of subject expertise will come along the road of further professional development. This will put our profession on the higher steps of the professions and will make it still relevant for the upcoming 22nd century.

From the experience I have just described I would also recommend:

- Provide placement and career training.
- Participate in career fairs.
- Speak to science clubs and student organizations.

- Establish formal mentoring networks. Mentor students working in the libraries. Talk to undergraduate library staff about the opportunities.
- Provide opportunities for students to shadow librarians to stimulate interest in librarianship.
- Establish a strong training program with practice reference questions so newly hired librarians can learn the job on the job. Provide training specific to the dynamics of entry-level and early career challenges.
- Establish librarian-in-residence program. During this program, new library school graduates can apply to it and receive one year of experience in academic setting. These newly graduates receive at least a year of experience under their belts. For finding such programs by state visit the Career Resources at the Association of Research Libraries (ARL) web page.
- Sci/tech librarians could teach a technology resources and services course at their area's library school relying on practical experiences in their libraries. This way the instruction could unveil the picture of sci/tech librarianship and attract more students to the profession.
- Improve work environment and provide a challenging, stimulating workplace with ample opportunities for professional development.
- Pay sufficiently for higher job requirements (Brown 2007).

Recommendations for *Both* Library School Educators and Library Managers

Lillard and Wales (2003) call for collaboration: "Academic librarians and LIS educators must work together to seek creative approaches to strengthening LIS education. Collaboration between the two groups is one of the best ways to ensure that practitioners have a strong voice in education for the profession." Increasing the communication channels and fostering a two-way collaboration between library educators and academic librarians can help ensure that science and technology librarianship will have enough well-prepared librarians to fill vacancies in engineering libraries and other sci/tech institutions. This can be achieved by:

- Retiring outdated practices.
- Having a presence at job/information fairs for students with sci/tech background.
- Establishing partnerships between themselves and build bridges to fill up the gaps along the line from recruiting students for librarianship and preparing them for sci/tech librarianship (Smith 2007, Level & Blair 2007). Roland (2000) describes one particularly successful partnership between the U.S. Environmental Protection Agency and the School of Information and Library Science at the University of North Carolina at Chapel Hill, enabling LIS students to acquire practical experience in a science library at the same time building the theoretical foundations at the library school.

- Building student and science librarians retention programs (Kawasaki 2007).
- Networking with professional associations in mentoring and retention of science librarians (Davidson & Middleton 2007).

Practical Advice for the Newly Graduated: From the Trenches of the University of Maryland

Adapting to an Academic Engineering Library

As a new librarian, applying the theories of library science to the reality of practice can be stressful and overwhelming. The first step in starting an academic career is to become acclimated to the new environment. Here are some things to do to become more familiar with the new surroundings:

- Check the web sites of the colleges and departments to which you are responsible. The web site usually contains information about classes and programs offered, and faculty information.

- Get to know your collection by browsing the physical stacks with books, journals, and the reference materials. Also, while providing reference at the physical desk, in slow times explore the library's web site for list of databases, e-journals, subject guides and tutorials. Looking at the existing resources in the collection allows you to get familiar with the resources in the science and technology fields available and thus increase your subject expertise. Also, you might create later a weeding project to free up some space in your library and transform it into a friendlier virtual environment.

Continuing Education and Developing Subject Expertise

As stated previously, increasingly librarians start their careers in sci/tech librarianship without any science background. In these cases, the new professional will not have in depth knowledge of the subject discipline; however, with an inquiring mind and willingness to learn, one can attain a sufficient level of subject expertise. Below are some tips to become a subject expert.

- Teach reference sessions to support library staff. Subscribe to various electronic discussion listservs to keep up to date about new database releases and features. Pick a database that has been recently updated with new features and share it with library support staff.

- Seek support and assistance from colleagues and peers. Don't be afraid to ask questions. Be a leader in establishing a group similar to New Librarians

Network (Archer & Tchangalova 2006) created at the University of Maryland (University of Maryland). Another example is the New Librarians Interest Group (NLIG) at Milner Library in Illinois State University (Estep & James 2005).

- If your institution has an established mentoring program, take advantage of it. Find your mentor to guide you through the maze of the sci/tech librarianship and establish a professional development plan. Don't limit yourself to mentors within your institution. Take advantage of associations and societies' mentoring programs such as the STS Continuing Education Committee's mentoring program (American Library Association).

- If there is not one available in place, become a leader in establishing a Librarian Journal Club where someone would give a presentation discussing a recent journal article that they found interesting and then the group would discuss the methodology of the research, whether or not the conclusions were valid based on the evidence presented, what alternate explanations could be given for the data, etc. This way you can increase your potential in doing research which is often a requirement for tenure and at the same time establish a support group for sci/tech librarians to share common research issues.

- Look for funding opportunities to attend library conferences. Often academic institutions provide funds to attend a library conference or a training program out of campus.

- Some libraries have established monetary funds, such as Library Research Fund (University of Maryland), "to promote, stimulate, encourage, and support the research of library faculty."

- For more avenues to explore, I will recommend two books: "The Successful Academic Librarian" edited by Gregory (2005) and "New Librarian, New Job" edited by Tucker and Sinha (2006). Also, Peter Fritzler (2007) and Sarah Jeong (2007) shared their personal experiences on how they became science librarians without having a scientific background.

Liaison Relationships

Establishing liaison relationships with your faculty is an extremely important part of your everyday duties. If you don't have a science or engineering background, the faculty of your assigned academic department can be very helpful in providing background for your discipline. Faculty members often recommend books, journals and other materials for purchase. They collaborate in the purchase of more expensive

and extensive resources, and advocate for libraries in difficult financial times. Also, establishing an effective communication line will be helpful for expanding your services not only to faculty but to students as well. Library instruction is a vital part of the educational efforts of any academic institution.

Time Management

As a new librarian you will have many duties assigned, so it is crucial to establish good organizational skills. In this technological era, it is imperative for librarians to be able to multitask. A good practice is to devote a specific amount of time for each of your assigned duties.

A Vision for the Future

Perhaps we shouldn't be so focused on the requirements of being a sci/tech librarian and having a subject background. From my personal experience working with graduate students, there is a feeling that subject specialization in the sciences is not required in order to provide quality science reference service. An exception could be argued for the field of chemistry librarianship, as it is suggested in literature and from the dual degree programs available for this discipline. Perhaps instead we should focus on some common principles and skills that contemporary academic librarians should have – a commitment to teaching lifelong information literacy skills, advocating for better organization of digital information and more open digital information space, willingness to learn and incorporate new technology into their everyday work in libraries, sharp inquisitive mind and positive attitude, etc. If we look at the recruitment problem from this perspective, there is much less of a shortage of librarians with this skill set than there is of librarians with a specific understanding of one or more scientific disciplines. The only problem is to get individuals to jump onto the engineering library bandwagon. So, let us get to action and unveil the brightest side of our profession to all students undecided in their career choices and make it more visible and attractive.

Conclusion

There has been much attention in the library literature given to the debate over the necessity of the MLS, much less time has been devoted to questioning the legitimacy of requiring subject specific degree. Such expectations could truly be a challenge, as the financial reality of the average American population recently does not include a room for two expensive graduate degrees. And the libraries are not paying the salary levels higher than those for librarians without subject expertise. I'm hesitant to support the hiring of employees without library degrees but if the pool of candidates is limited, hire sci/tech librarians with science degrees but no library degree and make it

a part of the contract to complete the library coursework in a specific time frame. The same could be valid in the reverse situation – hire a librarian with MLS degree and require the person to complete a science degree within a specific time frame. Some libraries provide free tuition costs for continuing education. This could be an option, too.

"Failure to adopt methods of resolution are detrimental to the profession, as people possessing passion and dedication but lacking dollars [and time] become the librarians left behind" (Angell 2009). Efforts to recruit bright young people into the engineering library profession will be fruitful when they understand the requirements for entering the profession. This can be done by educating library students about what engineering librarianship is and by making connections between library graduate schools and engineering libraries. This is probably the most cost-effective way to achieve a higher number of candidates for vacancies in sci/tech librarianship.

On the other hand, sci/tech librarians should try to do some things by book or the regular way and at the same time looking at what others are doing. Take the inspiration, the imagination and the energy that the newly fresh graduates bring to the market. Allow them freedom to learn from the best and come up with some new ideas themselves. Part of learning from the best involves from looking deeply into our mistakes in our profession and looking outside for the best ideas from allied fields. Along this line, it is imperative to take advantage of the intelligence and imagination of these recent graduates who could bring excellent customer service skills and innovation to library operations. More cooperation is needed to fill the gap that exists between the curriculum offered by library schools and the applied needs of sci/tech academic libraries. Library schools need to accept the new requirements of the digital era and together with the sci/tech libraries to strengthen the profession in the long run. Together they have to begin dispelling the myths about sci/tech librarianship for those who want to enter the academic setting. Once we reach the point that our hybrid librarian, constituted from IT, sci/tech and reference components, is ready to go out, don't forget to supply him/her with the appropriate salary basket! Only then more people with sci/tech backgrounds will be interested in librarianship as a career. Library educators and academic sci/tech librarians must work hand in hand in strengthening the library profession, helping graduates gain diverse skills and perspectives. Foresight and persistence will reshape LIS education and make the doors to sci/tech librarianship more visible to graduate students. Let's take this map of recommendations and undertake a journey toward the region of science/technology librarianship and make it inviting place for future graduates!

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Appendix

http://southernlibrarianship.icaap.org/content/v10n03/tchangalova_n01_app.pdf.

Jumping onto the Bandwagon: New Librarians Navigating the Science/Technology Librarianship
Appendix

List of ALA-accredited library schools offering a science & technology course and a dual degree program

Note: The list does not presume to be complete. For more up-to-date information, check individual library school's web site.

	ALA-accredited library schools	Science & technology course available	Course description	Time offered	Dual degree program
1.	Alabama, University of www.slis.ua.edu	**LS 512: Information Resources--Sciences** http://www.slis.ua.edu/drupal5/?q=node/73	"Surveys scientific and technical communication, the bibliographic structure of science and technology, and information services for scientists and technologists. In-depth study of the major information sources in biology, chemistry, physics, mathematics, engineering, and geology is included."	Fall 2009 (Timetables available for Spring, Summer, Fall 2009)	N/A
2.	Albany, State University of New York www.albany.edu/cci/informationstudies/index.shtml	IST 645: Information Sources in the Sciences http://www.albany.edu/cci/informationstudies/courses.shtml	"Bibliographic structure, reference and information resources, research problems, specialized information problems and services in the pure and applied sciences. Recommended for individuals intending to take the Medical Library Association certification examination."	Not offered in the years 2008-2009. (Timetables available for Spring, Summer, Fall 2008 and 2009)	http://www.albany.edu/cci/informationstudies/gradprograms.shtml combined with degrees in English or History.
3.	Alberta, University of www.slis.ualberta.ca	LIS 520: Information Resources in Specialized Fields http://www.slis.ualberta.ca/listing_number.cfm (LIS 520: Science & Technology Info. Resources & Services)	"Information resources and their administration in a specialized field and for a specialized clientele. The emphasis is on the nature of the field, problems of collection development, bibliographic access, retrieval and use by the clientele, and administrative issues in solving these problems. Specialized fields regularly examined are law, business, and health sciences." e.g. An Introduction to Health Sciences Librarianship e.g. Science and Technology Information Resources and Services	Fall 2009 (Timetables available for Winter, Spring, Summer, Fall 2009 and Winter 2010)	http://www.slis.ualberta.ca/programs.cfm combined with Master of Arts in Humanities Computing

4.	Arizona, University of http://sirls.arizona.edu/	N/A	N/A	N/A	http://sirls.arizona.edu/nesprogram **combined with a** degree in **Near Eastern Studies.**
5.	British Columbia, University of www.slais.ubc.ca	LIBR 532: Science & Technology Info Sources and Services (New Curriculum) 538B: Specialized Literatures: Information Resources in the Sciences and Technology **(Equivalent Course in Old Curriculum)** http://www.slais.ubc.ca/COURSES/courses-summary.htm	"This course focuses on acquiring the knowledge and expertise needed for determining the information needs of clients, formulating search strategy, and accessing pertinent materials in science and technology libraries. In this course, we will examine the various types of information sources, both print and electronic, in the field of science and technology librarianship, as well as current issues facing science and technology librarians."	Not offered in the years 2008-2009. (Timetables available from years 2003-2009)	http://www.slais.ubc.ca/PROGRAMS/joint.htm combined with a degree in Archival Studies.
6.	Buffalo, State University of New York (Conditional) www.gse.buffalo.edu/programs/lis/	LIS 515: Information Sources and Services in the Sciences http://www.gse.buffalo.edu/current/course_descriptions_details.asp#lis515	"Examination and evaluation of resources in astronomy, biology, chemistry, engineering, geology, mathematics, physics, and other related areas. Includes an appraisal of the patterns of communication and research in the fields covered. Background in science is not required."	Spring 2009	http://www.gse.buffalo.edu/programs/lis/programs.asp combined with degrees in Law or Music.
7.	California - Los Angeles, University of http://is.gseis.ucla.edu/	251. Seminar: Specialized Literatures http://is.gseis.ucla.edu/programs/courses/course_catalog.htm	"Exposure to major literatures across spectrum of disciplines in three broad areas: (1) arts and humanities, (2) social sciences, (3) natural sciences and engineering. Students become familiar with knowledge structures; emphasis on reference and information sources for scholarly research."	Not being offered since 1999. Not planning to be offered according to the preliminary timetables until Summer 2011.	N/A

8.	Catholic University of America (Conditional) http://slis.cua.edu	LSC 708 (638): Science and Technology Information http://slis.cua.edu/courses/courses.cfm	"Survey of information resources for the natural and physical sciences, medicine, computer science, and engineering. Emphasizes research techniques utilizing resources in all formats. Covers the scientific research and publication process, trends and problems in science and technology and in science and technology information services. Prerequisite: 553 or 9 credits of graduate credit in a science or technology discipline."	Spring 2009 (Timetables available for 2004-2009)	http://slis.cua.edu/MSinLS/jointdegrees.cfm combined with degrees in Law, History, Biology, Musicology, English, or **Religious Studies.**
9.	Clarion University of Pennsylvania www.clarion.edu/libsci	LS 556: Bibliog of the Sciences http://www.clarion.edu/1317/?directory-query=Library+Science+Department&g.sc.secondaryEntries=true	"Survey of the literature and practice of librarianship in major areas of the sciences, including biology, chemistry, engineering, geology, mathematics, medicine, and physics."	Spring, Summer 2009 (Timetables available from Winter 2008 to Fall 2009)	http://www.clarion.edu/25497/ combined with a degree in Law.
10.	Dalhousie University http://sim.management.dal.ca/ (Canada)	INFO 6590: Information Sources in Science and Technology http://sim.management.dal.ca/Courses/MLIS_Courses_Offered/index.php	"Examines Canadian and international scientific and technical information, and considers the production, dissemination, access, organization, and use of the two types of information."	Winter 2010 (Timetables available for Fall 2009 and Winter 2010 only)	http://sim.management.dal.ca/Programs/ combined with degrees in Law, Public Administration, and Resource or Environmental Studies.
11.	Denver, University of www.du.edu/LIS	4375: Science & Technology Resources http://www.du.edu/education/programs/lis/descriptions.html	"This course provides the student with an opportunity to explore information resources in science and technology materials. It is a companion course to Reference (LIS 4060). Lecture, readings, class discussions, and exercises will address all formats of materials including print, non-print, electronic, and web resources."	N/A in the interactive schedule search (Timetables available for 2005 to 2009)	N/A but the university offers a Certificate of Advanced Study in Law Librarianship **http://www.du.edu/education/programs/lis/**

12.	Dominican University www.gslis.dom.edu	LIS 742: Reference sources in the sciences http://www.dom.edu/academics/gslis/programs/course-descriptions.html	"Introduction to communication patterns and bibliographic control of information in the pure and applied sciences. Emphasis is on reference sources as they relate to user information needs and on the identification and optimization of appropriate search techniques, both manual and automated."	Password protected (Available course schedule for searching after login) (Timetables available from 2006-2014)	http://www.dom.edu/academics/gslis/programs/dual-degree-programs.html combined with degrees in Business Administration, Theology, Public History or Public Music.
13.	Drexel University www.ischool.drexel.edu	INFO674: Resources in Science and Technology http://www.ischool.drexel.edu/Home/Academics/CourseDescriptions/List	"Studies major information resources in pure and applied sciences, including the physical and biological sciences, engineering, and technology, and interdisciplinary subjects. Emphasizes bibliographic organization, collection building/management of print and electronic resources, as well as user needs, and reference service."	Projected online course offerings in Fall and Summer	http://www.ischool.drexel.edu/CS/GraduatePrograms/Dual combined with a degree in Information Systems.
14.	Emporia State University http://slim.emporia.edu	N/A	N/A	N/A	N/A
15.	Florida State University www.ci.fsu.edu	N/A	N/A	N/A	N/A
16.	Hawaii, University of www.hawaii.edu/lis	**LIS 660: Information Sources & Systems in Science** http://www.hawaii.edu/lis/courses.php?page=descriptions	"Bibliographical structure and sources in the basic and applied sciences, including physics, chemistry, biology, medicine, agriculture, engineering. Includes field component."	Last offered in the Fall 2006	http://www.hawaii.edu/lis/program.php?page=dual combined with degrees in American Studies, Asian Studies, Educational Technology, History, Information & Computer Sciences, Juris Doctor or Pacific Island.

17.	Illinois, University of www.lis.uiuc.edu	LIS522: Information Sources and Services in the Sciences http://www.lis.uiuc.edu/oc/courses/catalog/catalog.html	"Overview of the information needs and practices of researchers, practitioners, and the general public. Detailed consideration of disciplinary literatures and print and electronic reference materials. Advanced training in addressing reference questions and research problems in the sciences."	Spring 2009 (Timetables available for Spring, Summer and Fall 2009)	N/A
18.	Indiana University www.slis.indiana.edu	S523: Science and Technology Information http://www.slis.indiana.edu/courses/course.php?course=S523 ***Note:*** This course was known as L624: Information in Science and Technology prior to the Fall 2007 semester.	"General materials, reference books, periodicals, government documents, nonbook media in the individual literature of individual disciplines; patents and report literature. Examination of production, publication, distribution, and forms of scientific and technical literature."	Summer 2009 (Timetables available for Summer and Fall 2009, also a long range timetables for 2010 and 2011)	http://www.slis.indiana.edu/degrees/joint/ combined with degrees in more than 13 subject areas. The university offers a Chemical Information Specialization (http://www.slis.indiana.edu/degrees/joint/cheminfo_mis.html and http://www.slis.indiana.edu/degrees/joint/cheminfo_mis.html)
19.	Iowa, University of http://slis.uiowa.edu/~slisweb/	N/A	N/A	N/A	http://www.slis.uiowa.edu/drupal/?q=programs_degrees#joint combined with degrees in Business or Law. In addition, the school offers certificate in Book Studies.
20.	Kent State University www.slis.kent.edu	60622: Science/technology Information Sources and Services http://www.slis.kent.edu/content/view/17/43/	"Content, bibliographic structure and communication patterns in the sciences with emphasis on pure and applied fields, e.g., mathematics, biology, physics."	Rotation between campuses: *Kent:* Spring (odd) *Columbus:* Summer (odd) and Spring (even)	http://www.slis.kent.edu/content/view/194/118/ combined with degrees in Business Administration or Information Architecture and Knowledge Management.

21.	Kentucky, University of www.uky.edu/CIS/SLIS	N/A	N/A	N/A	http://www.uky.edu/CIS/SLIS/schoolmedia/intro.htm Certification in School Media
22.	Long Island University www.liu.edu/palmer	LIS 604: Science and Technology Sources and Services http://www.cwpost.liu.edu/cwis/cwp/cics/palmer/courses/index.html	"A study of the background, trends, terminology, and notable publications in the physical and biological sciences, engineering, and technology. Special consideration is given to the forms taken by scientific literature, bibliographic, selection, and reference sources. The needs of the user of various types of libraries are emphasized."	Spring 2009 (Timetables available for Winter and Spring 2009)	http://www.cwpost.liu.edu/cwis/cwp/cics/dual_masters.html combined with a degree in virtually any discipline offered by the New York University Graduate School of Arts and Science
23.	Louisiana State University http://slis.lsu.edu	7202: Resources for Science and Technology http://slis.lsu.edu/courses.html	"Information resources in major areas of pure and applied sciences."	Fall 2009 (actually offered every Fall) (Timetables available from Summer 2008 through Spring 2011)	N/A but offers a Certificate of Advanced Study in Library and Information Science http://slis.lsu.edu/degrees.html
24.	McGill University www.mcgill.ca/sis/ (Canada)	N/A	N/A	N/A	N/A but offers certificate and a diploma http://www.mcgill.ca/sis/programs/
25.	Maryland, University of www.clis.umd.edu	**LBSC 756: Information Access in Science and Technology** http://ischool.umd.edu/courses/course_descriptionsLBSC.shtml	"Research methods, practice, information needs, information structure, and information sources and services in science and technology (for example, biology, chemistry, physics, math, agriculture, computer science, engineering)."	Spring 2009 (Timetables available for Fall 2008, Winter, Spring, Summer and Fall 2009)	N/A

26.	Michigan, University of www.si.umich.edu	N/A	N/A	N/A	http://www.si.umich.edu/msi/dual/default.htm combined with degrees in Business Administration, Medicine, Public Policy, Law, Nursing, or Social Work.
27.	Missouri-Columbia, University of http://sislt.missouri.edu	N/A	N/A	N/A	N/A
28.	Montreal, University of www.ebsi.umontreal.ca (Canada)	SCI6347: Sources of information : Sciences pure, applied http://www.progcours.umontreal.ca/guichets/progcours/cours/index_fiche_cours/SCI6347.html	*Translation:* Journal of information sources in the field of pure and applied sciences. Searching, evaluation, selection and promotion of sources. Information needs and behavior of customers.	Winter 2010 Not offered in 2009. (Timetables available Winter, Summer, Fall 2009; Winter, Summer 2010)	N/A only various certificates offered http://www.ebsi.umontreal.ca/prog/index.html
29.	North Carolina - Chapel Hill, University of http://sils.unc.edu	**INLS 703 (222): Science Information** http://sils.unc.edu/programs/courses/descriptions.html	"Survey of the communication of scientific information and the information sources in the physical and biological sciences; emphasis on major bibliographic and fact sources, including online reference services."	Fall 2008 (Not offered in 2009) (Timetables available for Fall 2007, Spring, Summer, Fall 2008, and Spring, Summer, Fall 2009)	http://sils.unc.edu/programs/dual_degrees/index.html with several other schools and programs
30.	North Carolina - Greensboro, University of (Conditional) http://lis.uncg.edu	612: Science and Technology Information Sources http://www.uncg.edu/grs/bulletin/library.html#lis	"Major bibliographic and information sources and services in the sciences and technology."	Spring and Fall 2009 (Timetables available from 2008 through 2011)	N/A

31.	North Carolina Central University www.nccuslis.org	LSIS 5240: Science and Technology Resources and Services http://www.nccuslis.org/courses/coursesd.htm	"Selection and use of the print and electronic resources of the various scientific and technical disciplines and the characteristics and needs of users."	Spring 2009 (Timetables available for Spring, Summer, Fall 2009)	N/A
32.	North Texas, University of http://www.ci.unt.edu	**5630: Information and Access Services in Science and Technology** http://www.unt.edu/catalog/grad/slisc.htm	"Information resources, methods, needs and services in science and technology. Comparative study of individual fields. Communication patterns and bibliographic organization. Role of professional organizations and government. Representative problems and practice."	Spring and Summer 2009 (Timetables available for Spring, Summer and Fall 2009)	N/A but offers certifications
33.	Oklahoma, University of www.ou.edu/cas/slis	N/A	N/A	N/A	N/A
34.	Pittsburgh, University of www.ischool.pitt.edu	LIS 2545: Science and Technology Resources and services http://www.ischool.pitt.edu/lis/courses/descriptions.php	"Information resources and services in science and technology, including primary and secondary publications, electronic text, image and numeric databases; user needs and communications patterns within the scientific community."	Summer 2009 (Timetables available since 1998)	N/A
35.	Pratt Institute www.pratt.edu/sils	N/A	N/A	N/A	http://sils.pratt.edu/dai.html with a Master of Fine Arts in Digital Arts http://sils.pratt.edu/dual-degree.html with Master of Science in History of Art

36.	Puerto Rico, University of http://egcti.upr.edu	***Translation*:** **CINF 6118: Production and Use of Information in Science and Technology /** http://egcti.upr.edu/index.php?option=com_content&task=view&id=151&Itemid=126	*Translation:* Study of the development, current trends and methodology of science and technology, process and problems of research information resources in various formats and media; habits and information needs of experimental scientists and technologists, and the education of information professionals specializing in Science and Technology.	Spring 2009 (Timetable available for the current semester only)	N/A
37.	Queens College, City University of New York http://qcpages.qc.cuny.edu/GSLIS	**GSLIS 713: Information Sources and Service: Science and Technology** http://qcpages.qc.cuny.edu/GSLIS/coursecatalog.html	"Study and application of reference, bibliographic and other information sources (print and electronic) in science and technology; techniques and procedures for serving the needs of various clientele; criteria for evaluating these sources and service for developing appropriate collections."	Fall 2009 (Timetables available for Fall 2008, Spring, Summer, Fall 2009)	N/A
38.	Rhode Island, University of (Conditional) www.uri.edu/artsci/lsc/	**LSC542: Library Materials in Science and Technology** http://www.uri.edu/artsci/lsc/Academics/Courses/coursedesc.html	"Library resources in science and technology, including the major works, serial publications, and reference and bibliographical materials."	Online: Fall 2008 In person: Even Fall. Next offering: Fall 2010.	http://www.uri.edu/artsci/lsc/Academics/dualdegree.html with degrees in History, Public Administration, or English. ***Note:*** "[…] students may be able to establish cooperative programs with other master's degree programs within the University."
39.	Rutgers University www.scils.rutgers.edu	542: Information Resources in Science and Technology http://www.scils.rutgers.edu/component/option,com_courses/task,listing/sch,17/cur,610/Itemid,54/	"Generation, communication, use, bibliographic structure, and resources of scientific and technical information for managing collections and providing reference and information retrieval (IR) services. Special attention to the fields of biology, medicine, chemistry, physics, mathematics, engineering, agriculture, and the environment."	(Only Spring 2008 available but course not offered at this semester)	N/A

40.	St. John's University www.stjohns.edu/libraryscience	**LIS 252: Information Sources in Science & Technology** http://www.stjohns.edu/academics/graduate/liberalarts/departments/lis/requirements/courses/elective.stj	"The structure and literature of scientific and technical communication. Print and electronic references are examined. A background in the sciences is not required or assumed. "	N/A	N/A
41.	San Jose State University http://slisweb.sjsu.edu	LIBR 220: Resources and Information Services in Professions and Disciplines **http://slisweb.sjsu.edu/classes/coursedesc.htm** ---------- LIBR 220-01 LIBR 220-10 *Topic:* Intellectual Property Searching on the Internet Fall 2006 Greensheet http://slisweb.sjsu.edu/courses/220.ardis/220fa06gs.htm Very obscure web page. Hard to find.	*General description*: "Examination of the nature of resources for, and services to, professions and disciplines including methods of communication, characteristics of users, and current methods of meeting research needs in libraries and information centers. Examples of topics studied include: Legal Resources, Business Resources, Maps and Geographic Information Systems, Film and Media Collections, Digital Humanities, GLBT services, services for older adults, Latino patrons, African American patrons, Asian-American patrons, Native American patrons." ---------- "The course covers intellectual property searching in all types of libraries and information centers. Special emphasis will be given to U.S. patent and trademark information, publications and databases, their organization, use in libraries and methods of searching including by inventor, owner, and subject of invention. International patents and trademarks will also be covered, particularly as they relate to U.S. intellectual property. Copyright, trade secret, and other areas of intellectual property will be covered as they relate to our main topic: patents and trademarks."	Fall 2009 (online) (Timetables available from 2003 to 2009)	N/A

42.	Simmons College www.simmons.edu/gslis	LIS-484: Sci/Tech Literature http://www.simmons.edu/gslis/academics/courses/electives/index.php	"The structure and properties of the literature of science and technology as they relate to information generation, dissemination, and use. Major reference sources and bibliographic tools encountered in scientific information work, including exposure to machine-readable sources. Collection development, scientific communication patterns, bibliographic instruction, and other topics related to scientific technical information handling. Practical assignments in scientific and technical reference, and individual projects."	Fall 2009 (Timetables available for Spring, Summer, Fall 2009)	http://www.simmons.edu/gslis/academics/programs/dual/index.php "The school offers a dual-degree for students pursuing an undergraduate degree in the sciences and a master's degree in library and information science."
43.	South Carolina, University of www.libsci.sc.edu	SLIS 747: Science and Technology Information Services http://www.libsci.sc.edu/program/newcoursesoffered.htm#general	"A survey of the literature in the basic sciences & applied technical fields. Examines distinctive features of materials, research, and information communication patterns in the various fields. Practice in question consultation and database searching will be included."	Fall 2009 (Timetables available for Spring, Summer, Fall 2009)	http://www.libsci.sc.edu/program/degrees.htm with degrees in English and History.
44.	South Florida, University of www.cas.usf.edu/lis	LIS 6630: Information Sources and Services in Science and Technology http://slis.usf.edu/graduate/courses/descriptions/	"Study of representative reference sources in pure and applied sciences with equal attention given to typical problems encountered in scientific and technological reference service."	Timetables available for the current semester only. For other semesters they are accessible after login in OASIS.	N/A
45.	Southern Connecticut State University www.southernct.edu/ils	**ILS 617: Science-Technology - Literature and Sources** http://www.southernct.edu/ils/coursedescriptions/	"The various type of organization and publication of Sci-Tech information sources and literature are examined. The functions of science and technology library and information centers in providing conventional library resources as well as online database services for different user needs are explored. Prerequisite: ILS 504. Scheduled spring semester of odd years."	Not offered in 2007, 2008 and 2009 (Timetables available from 2001 to 2009)	N/A

46.	Southern Mississippi, University of www.usm.edu/slis	N/A	N/A	N/A	N/A
47.	Syracuse University www.ist.syr.edu	IST 608 Scientific and Technical Information http://ischool.syr.edu/academics/graduate/mls/mls_curriculum.aspx#Electives	"Role of physical and life sciences and technology in society. Structure and communication channels of the scientific community. Research trends, user needs, information systems in selected disciplines and interdisciplinary areas."	Not offered in 2009 (Timetables available for Spring, Summer, Fall 2009)	N/A
48.	Tennessee, University of www.sis.utk.edu	SIS 532: Sources and Services for Science and Engineering http://www.sis.utk.edu/courses/listings#graduate	"Information sources in engineering, physical and life sciences." Full description available at http://www.sis.utk.edu/files/532syl.pdf	Spring 2009 Online (Timetables available for Spring, Summer, Fall 2009)	N/A
49.	Texas - Austin, University of www.ischool.utexas.edu	N/A	N/A	N/A	http://www.ischool.utexas.edu/programs/ with degrees in Women's and Gender Studies, and Middle Eastern Studies.
50.	Texas Woman's University (Conditional) www.twu.edu/cope/slis	N/A	N/A	N/A	http://www.twu.edu/library-studies/mls-ms-health-studies-degree.asp with a degree in Health Studies
51.	Toronto, University of www.fis.utoronto.ca (Canada)	FIS2132H: The Literature of Science and Technology http://www.ischool.utoronto.ca/programs-courses/course-list	"A critical examination of the generation, production and use of primary, secondary and tertiary information in science and technology. Emphasis is on the understanding and control of a broad spectrum of general materials with consideration of particular types of resources (e.g., patents, standards), particular disciplines and current issues in scientific and technical information."	Winter 2009 (Timetables available for Fall 2008, Winter and Summer 2009)	http://www.ischool.utoronto.ca/programs-courses/jd/mi-combined-program with a Juris Doctor degree.

52.	Valdosta State University www.valdosta.edu/mlis/	MLIS 7160: Science and Technology Information Services http://www.valdosta.edu/mlis/courses.shtml	"A broad-based survey of the processes and resources used to provide reference services in various science and technology settings. Content represents the fields of biomedical and life sciences, earth and environmental sciences, computer science, astronomy, physics, chemistry, and mathematics."	Fall 2008 (Timetables available from Spring 2008 to Summer 2009)	N/A
53.	Washington, University of www.ischool.washington.edu	N/A	N/A	N/A	N/A
54.	Wayne State University www.lisp.wayne.edu	LIS 7120: Science and Technology Information Services and Resources http://slis.wayne.edu/courses/descriptions.php	"The generation, organization and pattern of bibliographic control of the literature of both the basic and the applied sciences. Characteristics of the scientific method and the scientific community. Bibliographic organization, reference tools and major databases."	Spring/Summer 2009 (Timetables available for year 2009 only)	http://slis.wayne.edu/degrees/joint.php with a degree in History
55.	Western Ontario, University of www.fims.uwo.ca/mlis/index.htm	LIS 9319 (591): Information Sources and Services in Science, Technology and Medicine http://www.fims.uwo.ca/mlis/courses/Elective-Courses.htm	"Nature and communication of scientific, medical and technological research. Information needs and uses of researchers and practitioners in these disciplines. Specialized forms of literature and information in science, medicine and technology. Organization of library and information services and their evaluation."	Summer 2008 Fall 2009 Winter 2010 (Timetables available from Summer 2008 to Summer 2009)	N/A
56.	Wisconsin - Madison, University of www.slis.wisc.edu	N/A	N/A	N/A	http://www.slis.wisc.edu/academics/index.html with a degree in Law but offers opportunities for other subject disciplines.

57.	Wisconsin - Milwaukee, University of www.uwm.edu/Dept/SOIS/	L&I SCI 834 (813): Information Sources and Services in Science and Technology http://www.graduateschool.uwm.edu/students/prospective/areas-of-study/library-and-information-science/#courses	"A study of the reference literature of science and technology; the structure of the literature; and services of the various information sources in those fields."	Not offered in 2008 and 2009 (Timetables available from Spring 2008 to Fall 2009)	http://www4.uwm.edu/sois/academics/coordinatedMLIS/index.htm with degrees in Anthropology, English, Foreign Language & Literature, Geography, Health Care Informatics, History, Music, and Urban Studies.