BACHELOR OF SCIENCE DEGREE

IN

CLINICAL LABORATORY SCIENCE

(Medical Technologist)

Program Proposal

August --- 2009

DIXIE STATE
COLLEGE OF UTAH

Program Proposal

Dixie State College

Baccalaureate of Science Degree -- Medical Technologist Program

Table of Contents

Appendices

SECTION I: The Request

Dixie State College of Utah requests approval to offer a Baccalaureate of Science Degree in Clinical Laboratory Science to prepare Clinical Laboratory Scientists/Medical Technologists for the healthcare field. This will be effective, September 2012. The program was approved by the institutional Board of Trustees on ----------.

SECTION II: Program Description (MT)

Description

The field of Clinical Laboratory Science is both diversified and stratified. A National Institute of Health publication describes the field thus: "The clinical laboratory staff is a team of skilled professionals with education in a variety of scientific areas. The majority of laboratory testing is performed by (Medical) Laboratory Technicians with two years of education or Clinical Laboratory Scientists (Medical Technologists) with four years of education. Other individuals involved in clinical laboratory practice include physicians (pathologists), other scientists (chemists, microbiologists), laboratory assistants and phlebotomists." [1] The full title of Clinical Laboratory Scientist/Medical Technologist has been reduced to Medical Technologist in common use among those in the discipline. This is the term that will be used in this proposal or the initials "MT" where appropriate.

Two leadership roles have emerged within the laboratory environment. The pathologist carries out administrative responsibilities for the lab and the technologist assumes supervisory functions for lab activities. Training for such roles is part of their pre-service preparation. The clinical laboratory professional is qualified by academic and applied science education to provide service and research in clinical laboratory science and related areas in rapidly changing and dynamic healthcare delivery systems. These professionals perform, develop, evaluate, correlate and assure accuracy and validity of laboratory information; direct and supervise clinical laboratory resources and operations; and collaborate in the diagnosis and treatment of patients. The professional has diverse and multi-level functions in the areas of analysis and clinical decision-making, information management, regulatory compliance, education, and quality assurance/performance improvement wherever laboratory testing is researched, developed or performed. Such specialists possess skills for financial, operations, marketing, and human resource management of the clinical laboratory. Clinical laboratory professionals practice independently and collaboratively, being responsible for their own actions, as defined by the profession. They have the requisite knowledge and skills to educate laboratory professionals, other health care professionals, and others in laboratory practice as well as the public.

The ability to relate to people, a capacity for calm and reasoned judgment and a demonstration of commitment to the patient are essential qualities. Communications skills extend to consultative interactions with members of the healthcare team, external relations, customer service and patient education.

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[1] See Frances A. Delwiche, *Mapping the Literature of Clinical Laboratory Science*; http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=164393.

Laboratory professionals demonstrate ethical and moral attitudes and principles that are necessary for gaining and maintaining the confidence of patients, professional associates, and the community.[2]

The proposed program here at Dixie State is designed to prepare medical technologists for the field through the acquisition of a four year baccalaureate degree in science. The MT program will meet accreditation requirements fully preparing students to successfully enter the profession at the completion of the program. Using both innovative and traditional strategies, this will be achieved by:

a) General education coursework;
b) Specific courses serving as prerequisites to program coursework;
c) Theory courses founded in laboratory science;
d) Laboratory classes conducted on campus;
e) Clinical courses held in the field under the supervision of medical professionals;
f) A cohort model to develop teaming expertise within the program.

Purpose of the Medical Technologist Program

The degree will incorporate an emphasis in chemistry and prepare participants with the skills and tasks demanded by the field. At career entry, the medical technologist will be proficient in performing the full range of clinical laboratory tests in areas such as hematology, clinical chemistry, immunohematology, microbiology, serology/ immunology, coagulation, molecular diagnostics, and other emerging diagnostics, and will play a role in the development and evaluation of test systems and interpretive algorithms. This specialist will have diverse responsibilities in areas of analysis and clinical decision-making, regulatory compliance with applicable regulations, education, and quality assurance/performance improvement wherever laboratory testing is researched, developed or performed. The clinical medical technologist will also possess basic knowledge, skills, and relevant experiences in:

A. Communications to enable consultative interactions with members of the healthcare team, external relations, customer service and patient education;

B. Financial, operations, marketing, and human resource management of the clinical laboratory to enable cost-effective, high-quality, value-added laboratory services;

C. Information management to enable effective, timely, accurate, and cost-effective reporting of laboratory-generated information, and;

D. Research design/practice sufficient to evaluate published studies as an informed consumer.[3]

This conceptual framework and set of professional skills will be provided by the DSC program.

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[2] National Accrediting Agency for Clinical Laboratory Sciences, *Guide to Accreditation for Clinical Laboratory Scientist/Medical Technologist Programs*, Chicago, Illinois: National Accrediting Agency for Clinical Laboratory Sciences, 2007) p. III-1.

[3] Ibid. III – pp. 1-2.

Geographically and professionally, there is a continuous need to provide trained and competent medical technologists both locally and beyond. This need and the changing demographics that drive it will be explained in greater detail in Section III. However, it should be noted here that approximately six years from the writing of this proposal, Intermountain Healthcare in Washington County alone will retire over 55% of their medical technologists creating a significant void to be filled. MT programs in the state rapidly place their graduates in local and national markets. Dixie State College will contribute significantly to the stream of technologists entering the field.

Institutional Readiness

The College now offers certificates, associate degrees and baccalaureate degrees in practical nursing, registered nursing, and RN to BSN; certified nurse assistant (CNA); dental hygiene; medical radiography; surgical technology; phlebotomy; respiratory therapy; and emergency services/paramedic programs. A physical therapist assistant program will begin spring 2010. This evolution of health science programs has produced an institutional infrastructure that remains prepared for expansion of new programs in the field of health sciences. The Medical Technologist Program is another step in Dixie State's pursuit of expanding its services to the healthcare professions locally and beyond.

Since 1995, Dixie State College has a history of providing quality health sciences programs. For example, the nursing program earned the highest pass rate among all programs in the state on the Registered Nurse Licensure Examination, with a collective pass rate of 96 percent in 2003, as reported by the Utah State Board of Nursing. Since graduating its first class in 2000, DSC's dental hygiene program has now scored in the top 10 percent in the nation four of the past five years and in the top five percent three of those five years.[4]

The timing of the proposed MT program is excellent since the new Russell L. Taylor Health Sciences Building was completed in the spring of 2008. It has sufficient facilities to provide classroom, laboratory space, and equipment for the program. The School of Science and Allied Health has the resources to support advising new and prospective students and to support the development and initiation of this program. A key component to the success of a new clinical practice program is the support of the local medical community and providers. The close and collegial working relationship between Dixie State and its medical associates has created a tapestry of collaboration for this degree. In turn, our graduates will serve these establishments as the medical needs of the community continue to grow.

Faculty

Presently, a nation-wide search is underway for a qualified professional to be a shared director for the MT and MLT programs. This will be both an administrative and teaching position. Upon approval of the MT proposal, a search will also be undertaken for a qualified fulltime tenure-track faculty member who will teach for both programs. Locally, there is an abundance of potential adjunct faculty with the background in clinical laboratory science needed to teach coursework. Intermountain Healthcare of Southern Utah accommodates a staff of medical laboratory technicians and technologists who can teach selected courses

[4] See Dixie State College of Utah, *College Catalog,* (Saint George, Utah: Dixie State College of Utah, 2006).

at Dixie State. Many of these professionals will conduct the clinical experiences in the field for the program. A number of local physicians also qualify as adjunct faculty, and they will be recruited as needed.

Staff

The current administrative assistant to the Dean of Science and Allied Health will provide the necessary secretarial support for the program. The academic advisor for pre-professional, health sciences, and applied technology programs will also serve MT program students.

Library and Laboratory Resources

The years of healthcare initiatives conducted at Dixie State have produced a solid and growing foundation of library resources that serve each successive program undertaken. The Val A. Browning Library has extensive learning resources in Nursing and the Allied Health Sciences including books (virtual and electronic), online data bases, DVDs and videotapes. Among these are full text articles including ProQuest Nursing and Allied Health Sources, MEDLINE, Clinical Pharmacology, Biomedical Reference Collection, Health Sources: Academic Addition, and others. Dixie Regional Medical Center also has a medical library that is available to Dixie State College students. These two sources will contribute to the scholarly work of the MT program. Additional materials that specifically address the MT curriculum will be added to the collection. These are listed in Appendix D along with the lab equipment to be purchased for the program and are accounted for in the budget referenced in Table five.

Admission Requirements

The standards established by Dixie State will be consistent across its health sciences offerings, holding the bar as high as possible to effectively meet the qualifications and preparation of students entering its programs. Attainment of a baccalaureate degree in science will be achieved through a two-tier approach. The first tier will be the acquisition of an associate of applied science degree qualifying to be a medical laboratory technician. The MLT degree qualifies the candidate to go into the field to work or to remain at Dixie State to complete the Medical Technologist Program.

The second tier will require qualifying for entrance into the MT program during the junior year. Since applicants from other MLT programs or from the field itself may apply, the following criteria are required for entrance into the MT program:

a) Submission of a complete program application on or before the deadline established by the department;
b) Graduation from an accredited institution with a GPA of 3.0 in his/her associate's degree;
c) Completion of all prerequisite courses required by the MT program with a grade of "C" or better;
d) Three letters of recommendation including at least one from an instructor in medical laboratory science;
e) Completion of BIOL 2320/2325 and BIOL 2420/2425 or equivalents;
f) The previous criteria must be met to qualify for an interview with the Selection Committee. Passing the interview will serve as the final criterion for entrance into the program. More about this gate will be explained in the section on standards.
g) Membership in a cohort group.

Additional criteria to be considered for acceptance:

- Previous experience in healthcare
- Weighted GPA in specific prerequisite courses
- Clearance of both a drug screen and criminal background check
- Proof of selected immunizations

Student Advisement

Presently, the college has an advisor for all of the health science programs with the exception of the nursing programs which share their own advisor. The advisor for pre-professional, health sciences, and applied technology programs will also serve students in the MT program. In addition, the program director and faculty will provide academic guidance and the college at large is served by advisors who assist students with general education and graduation requirements. The Division of Nursing and Allied Health works closely with all who advise its students.

Justification for the Number of Credit Hours

The MT program at DSC will require 71 credit hours for the Tier I portion of the program. This is two credit hours above the Board of Regent's guidelines for an AAS degree. The extra hours are required to assure adequate synchronized learning experiences among the classroom, laboratory, and clinic in the field.

Tier II will require 69 credit hours to complete the second portion of the baccalaureate degree. While the baccalaureate degree requires a total of 140 credit hours, each tier addresses its portion of those hours in a manageable format. It is consistent with the Weber State University's MT program and is in compliance with the requirements for this type of degree at Dixie State College. The courses and clinical experiences that fulfill general education requirements and those created for the MT specialty meet the demands of accreditation of the National Accrediting Agency for Clinical Laboratory Sciences. The course structure selected is consistent with similar programs across the country.

External Review and Accreditation

Medical Laboratory Science had its origins in the formation the American Society of Clinical Pathologists (ASCP) formed in 1922. In an effort to bring about a degree of standardization to the education of laboratory personnel, ASCP created the Board of Registry (BOR) in 1928 to certify individual laboratory technicians and later the Board of Schools (BOS) for the accreditation of educational programs. As the field became stratified, each specialty grew toward independence and autonomy. In 1973, as a result of pressure from the U.S. Office of Education and the National Commission on Accrediting, ASCP agreed to disband the BOS and turn over its functions to an independently operated and governed board, the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).[5]

Curricular guidelines for the preparation of a medical technologist are determined by this accrediting arm of the medical laboratory sciences. NAACLS is an autonomous, nonprofit organization. ASCP and the

[5] See Frances A. Delwiche, *Mapping the Literature of Clinical Laboratory Science*; http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=164393

American Society for Clinical Laboratory Science (ASCLS) are sponsoring organizations of NAACLS. The National Society for Histotechnology (NSH) and the Association of Genetic Technologists (AGT) are participating organizations. The American Association of Pathologists' Assistants (AAPA) is an affiliating organization. NAACLS is recognized by the Council for Higher Education Accreditation (CHEA). The proposed MT program at Dixie has been developed in accordance with the standards as set down in the Guide to Accreditation for Clinical Laboratory Science/Medical Technologist Programs.[6]

Once underway, the new program will begin the process of seeking accreditation. It must make application to NAACLS no later than two months prior to graduating its first cohort in order for the process to be completed in time for graduates to take the ASCP registry exams. This will involve a self study/visitation process which will receive a five year award cycle upon proof of compliance. Once accredited, a progress report must be submitted every two years from that date. The tools and strategies to be employed by DSC in this procedure are found in Section IV of this proposal.

The use of advisory committees has helped steer the development and unfolding of the various health sciences programs that have evolved over the years at Dixie State. Membership has included participants from the health sciences community, the public at large, and college faculty. Their work has resulted in a network of resources and professionalism that continues to raise the bar of excellence in the preparation of the next generation of health sciences professionals. An advisory committee will be established for the MT program in order to provide community-wide interpretation of program needs; systematically assess and identify needs of the local and regional healthcare workforce; provide advice regarding curricular changes; assist in assessment of educational outcomes and continued program improvement; and assist in placing clinical students and graduates.

This proposal has been created by: 1.) David L. Loughmiller MBA, MT, (ASCP), SC, Medical Technologist and General Laboratory Supervisor at Dixie Regional Medical Center and CEO of The Scepter Media and Training Firm, and 2.) Douglas C. Godwin, Ph.D., The Scepter Media and Training Firm Director of Research and a former faculty member for the past 27 years of Texas A&M University and more recently, Dixie State College of Utah.

Projected Enrollment

An examination of the ever expanding student interest in other healthcare programs at DSC and around the state suggests that there will be more than an adequate pool of students interested in the MT program. Based upon the number of clinical lab placements available among our medical affiliates, we will accommodate 12 new students each fall semester. A screening process will be conducted and the most qualified will form a cohort, moving through the program together. Following is the enrollment plan for the first five years and the faculty/student ratios required for each.

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[6] See National Accrediting Agency for Clinical Laboratory Sciences, *Guide to Accreditation for Clinical Laboratory Scientist/Medical Technologist Programs*, Chicago, Illinois: National Accrediting Agency for Clinical Laboratory Sciences, 2007).

Table I: Projected Faculty/Student Ratios

Year	Student Headcount	# of Faculty	Student-to-Faculty Ratio	Accreditation Req'd Ratio
2012- 2013	12	2	6:1	Not applicable
2013- 2014	24	2	12:1	Not applicable
2014- 2015	24	2	12:1	Not applicable
2015- 2016	24	2	12:1	Not applicable
2016- 2017	24	2	12:1	Not applicable

Section III: Need

Program Need

Clinical Laboratory Science is an area of healthcare that supports greater than 70% of all diagnostic testing. There are over 319,000 Clinical Laboratorians in the United States and more throughout the world. A large percentage of these Laboratorians were trained over 30 years ago and are fast approaching the age of retirement. As with other areas of healthcare, a significant shortage has occurred due to decreased preparation programs nationwide, focus on automation, and a move for consolidation of highly specialized procedures. It is estimated that by 2012, about 50% of all Clinical Laboratory Scientists will have left the workplace leaving an extreme need to train new professionals.

Todd Smith in *Advance Magazine* indicates that more physicians are requesting highly specialized analyses, items that in the past were considered low volume. In today's practice, the evaluation of nutritional status, genetic markers, and identification of infectious agents using complex techniques are processes that heretofore have been restricted to large referral centers. These technologies are making their way into the clinical laboratory settings in many hospitals and smaller central laboratories.[7] With the advent of automated processes and greater computerization of analytical procedures, the need for laboratory scientists well versed in many aspects of laboratory medicine is critical.

Weber State University and the University of Utah are the USHE institutions that offer degrees in the Clinical Laboratory Sciences. Medical establishments throughout the country heavily recruit many of the students graduating from these programs. Currently the Mayo Medical group actively recruits from Weber State and University of Utah graduates. Due to the magnitude of the shortage of accredited offerings nationwide, students are sought after by medical organizations upon admittance into their institutions' academic programs.

Dixie Regional Medical Center and other hospital laboratories throughout southern Utah, southern Nevada, and northern Arizona are at a disadvantage trying to recruit some of the students coming out of the schools

[7] T. Smith, "Automating the Hematology Lab", *Advance for Administrators of the Laboratory*, (Vol. 17, Issue 4, April 2008), p. 68.

on the Wasatch Front. Furthermore, individuals residing in southern Utah must relocate to the Wasatch Front to study these areas of healthcare or choose a different line of work. David Loughmiller, Laboratory General Supervisor for Dixie Regional Medical Center indicates that many graduates in biology from schools in the southern part of the state find it a challenge to get jobs in their field of study. Their training is not specific enough to meet the needs of healthcare and they end up moving out of the area to find employment. The MT program will provide them with a marketable option.

Labor Market Demand

The need for medical technologists in the state of Utah has continued to grow through the last 20 years. The ability to recruit in the southern Utah area has been difficult, resulting in the use of high cost temporary professionals to fill these positions. It is not unusual for recruiting to fill open positions to take from 6 to 18 months. The current retirement of staff is creating an increased number of openings. At Dixie Regional Medical Center it is estimated that by 2015, twenty-six positions will be open as a result of attrition due to retirement, a 65% loss of staff. According to *Jobs Rated Almanac: The Best and Worst Jobs* by Les Krantz, medical technologists are on the top 20 on the list of best jobs.[8] *Medical Laboratory Observer* in April 2008, indicates the average vacancy rate for staff technologists has increased 50% since 2003.[9]

There are a number of agencies that provide projections for employment as a medical technologist. The Utah Department of Workforce Services rates this profession as a 3-star occupation on a scale of 1 to 5 meaning that it has a moderate to strong employment outlook with low to moderate wages. They indicate that this occupation will experience faster than average employment growth with a moderate volume of annual job openings. Business expansion, as opposed to the need for replacements, will be the source of the majority of job openings in the coming decade.[10]

The U.S. Department of Labor projects a 12.4% increase in the need for medical technologists in the next 8 years (See Table 2) [11] It is estimated that there is a need for 16,500 Clinical Laboratorians per year and only 5000 are being produced through institutions of higher learning.[12]

Table 2: MT Growth Trends

Occupational Titles	Employment 2006	Projected Employment 2016	Change, 2006-16	
			Number	Percent
MT, CLS	167,207	187,960	20,753	12.4%

[8] See L. Krantz, *Jobs Rated Almanac: the Best and Worst Jobs,* 6th Edition, (Ft. Lane, New Jersey: Barricade Books, 2002).
[9] Staff Writer, "Labs Are Vital: Industry Takes Aim at Lab Workforce Shortage", *Medical Laboratory Observer*, (April 2008) p. 42.
[10] The Utah Department of Workforce Services, http://jobs.utah.gov (accessed January 2009).
[11] See National Employment Matrix, *Clinical Laboratory Technologists and Technicians, 2006 and Projected to 2016,* Department of Labor Statistics. http://www.bls.gov/oco/ ocos096.htm
[12] Staff Writer, *Advance Laboratory, (*King of Prussia, Pennsylvania, Dec. 2008) p. 35.

Student Demand

The trends in enrollment here at Dixie State and across the state seem to be the best indicators for student interest in the field of healthcare. The number of applicants for all healthcare programs at DSC exceeds the number of students that can be admitted. This is also true for other institutions of higher education in the state and those nearby. For example, current enrollments in the Introduction to Physical Therapy course at the College of Southern Nevada are 38 in the Internet course and 26 in the on-campus course. Over the past 4 years, first year enrollments in the physical therapist assistant program have resulted in full classes. Most recently, students enrolled in the program have traveled from Bullhead City, Arizona, Battle Mountain, and Mesquite, Nevada. The program has also received student inquiries from here in St. George.

DSC's School of Science and Allied Health has a designated advisor to interview students who express an interest in this profession. There has been a consistent pool of over 200 students per year that have sought information and academic advising about the health sciences professions and the courses that would likely fulfill prerequisite requirements. According to Loughmiller, there are approximately 25-30 queries per year at the Dixie Regional Medical Center from people interested in laboratory science.

The key factor seems not to be student interest as much as providing the adequate laboratory and clinical experiences that require low instructor/student ratios. The creation of the new Russell Taylor Health Sciences Center along with the collaboration between Dixie State and community health services has moved DSC significantly forward in the ability to meet the increasing interest in the healthcare professions. The MT program should be able to adequately accommodate 12 new students each year, and-24 pursuing the degree at any time beginning with the second year.

Similar Programs

Presently, Weber State University and the University of Utah are the USHE institutions that offer a program in Clinical Laboratory Science (MT). The proposed program at Dixie State will be similar to but unique from WSU's program. The similarity will permit students to matriculate between schools and from other programs when relocating without a significant loss of credit hours. The uniqueness emerges from the College's special use of affiliate resources to personalize the development of laboratory skills among its students.

This distinctiveness in curricular design is an important one. The clinical experiences occur throughout the program rather than becoming a single event at the end of the coursework. To plan field experiences that take place concurrently with classroom curriculum, local institutions must be willing to accommodate an ongoing flow of students. Community medical affiliates are enthusiastic participants. Such an approach provides a mentoring system for learners that guides the growth of professionalism simultaneously within three areas: the classroom, the laboratory, and the clinic.

Finally, Section III lays down an important foundation of need, justifying the creation of a MT program here at DSC. Such a program is vital in meeting not only local employment requirements but those throughout the state and beyond. The evidence makes it difficult to overstate this position.

Collaboration and Impact on Other USHE Institutions

Because of the need for medical technologists, no USHE institution in the state will unduly compete in the placement of graduates beyond normal institutional competition. This is also true for applicants to their programs since the interest of the public in healthcare careers shows no sign of diminishing. The previous Dean of Business, Science, and Health held informal discussions with CLS program chairs at the University of Utah and Weber State University with regard to DSC beginning its own MLT and MT programs. As well, the Associate Dean of Nursing and Allied Health consulted with these same individuals through the Laboratorian Committee of the Utah Graduate Medical Education Council.

As stated earlier, the need for a program in southern Utah is also important geographically. The DSC program should have no effect on enrollments at Weber State or the University of Utah because of its location in southern Utah. The population growth and trends in the Washington County demand a local expansion in educational opportunities. The need for such options was foreseen by the Board of Regents when first permitting Dixie State to become a college that provides baccalaureate degrees.

Benefits

Much of what has been written in this proposal reveals many of the benefits that a MT program will contribute to the College as it continues its role among other USHE institutions in the state. In response to community needs, the pursuit of this degree will be an ongoing service to the populace. As Dixie State continues to grow, the importance of its contributions to this county and the state will continue to grow proportionally.

Consistency with the Institutional Mission

The Bachelor of Science Degree in Clinical Laboratory Science is consistent with the mission of Dixie State College of Utah. As an institution in the Baccalaureate/Associate's College category designated by Regents' Policy, Dixie State's dual mission is to "[offer] baccalaureate programs in high demand areas and in core or foundational areas consistent with four-year colleges" and "to transmit knowledge and skills primarily through education and training programs at the certificate and associate degree level, including applied technology education programs"(DSC Mission Statement). As a result, DSC has taken steps to develop a healthcare professions core of programs. The proposed MT program and the accompanying AAS MLT program are the college's response to meeting the southern Utah community's need as well as meeting the DSC and Regents' missions.

Section IV: Program Assessment

Program Assessment

There has been a movement in institutions of higher education over the past four decades to enhance the pedagogical, assessment and curriculum expertise in the professional preparation programs they offer. As the professions continue to refine their standards, they have gravitated to common principles of what now is known as "best practice." Many of these are generic educational strategies that address new discoveries in brain theory and how such theory translates into cognition and behavior. Learning has been divided into the cognitive, psychomotor and affective domains.

The standards addressing best practice set down by NAACLS require the creation of program goals and objectives along with assessment strategies that measure the attainment of them. Assessment is to focus on outcomes. For student performance, this entails both formative assessment of ongoing progress and summative assessment of exit mastery. The plan must include a mechanism for continually and systematically reviewing the effectiveness of the program to include survey and evaluation procedures that incorporate information from students, employers, faculty, graduates, formative and exit examinations, and accreditation reviews. The MT Program at Dixie State will account for all such standards.

For assessment purposes, standardized Employer and Graduate Satisfaction Surveys are available from ASCP and will be utilized by the program. Graduate performance on credentialing examinations is available to the program from ASCP. It includes statistics comparing general graduate performance taken from many programs and is specific to content areas contained in the examination. The content areas refer to accreditation standards set down by ASCP.[13]

Following is the overall goal of the MT program. Table 3 presents the evaluation strategies to be utilized to access its attainment.

Program Goal: *The MT program is designed to (1) provide its students with the foundation of a liberal education and (2) prepare graduates to competently enter the workforce possessing the cognitive, psychomotor, and affective skills required by the profession.*

Table 3: Program Standards and Appraisal Strategies

DOMAIN	INTERNAL ASSESSMENT	EXTERNAL ASSESSMENT	OUTCOME/ ANALYSIS & REPORTING
Cognitive	• Graduates performance on registry exams o MT (ASCP) o CLT (NCA)	• Employers Surveys- [satisfaction with grad. knowledge base] • Advisory Committee assessment input • Grades from clinical lab. experiences • Students will present a portfolio of their work for review by professionals from the field & the faculty	• Reporting of analysis of pass rates on 3 registry exams • Reporting of analysis of employer feedback & satisfaction • Summary of clinical performance

[13] See National Accrediting Agency for Clinical Laboratory Sciences, *Guide to Accreditation for Clinical Laboratory Scientist/Medical Technologist Programs*, Chicago, Illinois: National Accrediting Agency for Clinical Laboratory Sciences, 2007).

Psychomotor	• Graduates must demonstrate competency in all skills required by the curriculum	• Employers Surveys- [satisfaction with grad. competency in performing all skills required]	• The program will assess student competence on random selected skills prior to exiting the program. • Employers' responses will also be analyzed and both will be reported.
Affective	• Faculty will assess students' behaviors specific to communication skills, ethics, work habits, interpersonal relations and collaborative skills. • Student surveys- [Upon graduation, students will provide feedback about program.]	• Employer surveys- Satisfaction with: 1) graduates ability to effectively interact with staff and colleagues, & 2) compliance with work expectations	• Affective findings will be analyzed and summarized prior to graduation. • Graduates' performance in the workplace will also be summarized and both findings will be reported.

Educational Standards and Student Performance

NAACLS has established the following standards for the preparation of Medical Laboratory Technologists.[14] Several of these have been summarized previously.

A. Curricular Structure

Instruction must follow a plan which documents a structured curriculum composed of general education, basic sciences, and professional courses including applied (clinical) education. The curriculum must include clearly written program goals and competencies and course syllabi which must include individual course goals and objectives.

The curriculum must include all the major subject areas currently offered in the contemporary clinical laboratory. Behavioral objectives which address cognitive, psychomotor, and affective domains must be

[14] Ibid pp. III- pp. 6-8.

provided for didactic and applied (clinical practice) aspects of the program and must include clinical significance and correlation. Course objectives must show progression to the level consistent with entry into the profession.

B. Instructional Areas

The curriculum must include:

1. Scientific content (either prerequisite or as an integral part of the curriculum) to encompass areas such as anatomy/physiology, immunology, genetics/molecular biology, microbiology, organic/biochemistry, and statistics.

2. Pre-analytical, analytical, and post-analytical components of laboratory services, such as hematology, hemostasis, chemistry, microbiology, urinalysis, body fluids, molecular diagnostics, immunology, phlebotomy, and immunohematology. This includes principles and methodologies, performance of assays, problem-solving, troubleshooting techniques, interpretation of clinical procedures and results, statistical approaches to data evaluation, and continuous assessment of laboratory services for all major areas practiced in the contemporary clinical laboratory.

3. Principles and practices of quality assurance/quality improvement as applied to the pre-analytical, analytical, and post-analytical components of laboratory services.

4. Application of safety, governmental regulations, and standards as applied to laboratory practice.

5. Principles of interpersonal and interdisciplinary communication and team-building skills.

6. Principles and application of ethics and professionalism to address ongoing professional career development.

7. Education techniques and terminology sufficient to train/educate users and providers regarding laboratory services.

8. Knowledge of research design/practice sufficient to evaluate published studies as an informed consumer.

9. Concepts and principles of laboratory operations must include:
   a. Critical pathways and clinical decision making;
   b. Performance improvement;
   c. Dynamics of healthcare delivery systems as they affect laboratory service;
   d. Human resource management to include position description, performance evaluation, utilization of personnel, and analysis of workflow and staffing patterns, and;
   e. Financial management: profit and loss, cost/benefit, reimbursement requirements, and materials/inventory management.

C. Learning Experiences

The learning experiences needed in the curriculum to develop and support entry level

competencies must be properly sequenced and include instructional materials, classroom presentations, discussion, demonstrations, laboratory sessions, supervised practice and experience.

1. Student experiences must be educational and balanced so that all competencies can be achieved.

2. Student experiences at different clinical sites must be comparable to enable all students to achieve entry level competencies.

3. Policies and processes by which students may perform service work must be published and made known to all concerned in order to avoid practices in which students are substituted for regular staff. After demonstrating proficiency, students with qualified supervision may be permitted to perform procedures. Service work by students in clinical settings outside of academic hours must be noncompulsory.

D. Evaluations

Written criteria for passing, failing, and progression in the program must be provided. These must be given to each student at the time of entry into the program. Evaluation systems must be related to the objectives and competencies described in the curriculum for both didactic and applied components. They must be employed frequently enough to provide students and faculty with timely indications of the students' academic standing and progress and to serve as a reliable indicator of the effectiveness of instruction and course design.

Dixie State is prepared to meet these standards through planned experiences for its students. These will be housed in four modes of educational activity.

A. Structured Cohorts—Each semester, students entering the program are formed into a cohort. They will remain together throughout the program, allowing for relationships to form. This structure allows for team activity that cuts across courses where appropriate. The cohort model provides an ideal infrastructure to develop leadership, professionalism, and collaborative skills among the students.[15]

B. Didactic courses—In addition to the methods suggest in item C above, additional strategies will be employed such as team projects, simulations, role play, pairing strategies, study sessions, quizzes, exams, task-conferencing and more. Care has been taken to sequence the coursework and space the offerings to build on prerequisite knowledge allowing time for adequate learning the esoteric concepts and language of the profession.

C. Laboratory courses—The new medical facilities offer optimum space and equipment for the lab experiences that will be provided. These will be conducted by faculty and will address both conceptual understanding and skill acquisition.

D. Clinical experiences—A number of medical facilities in Southern Utah will provide the clinical experiences for our students. Working in collaboration, on-site clinical involvement will be woven into the

[15] See Peter R. Scholtes, Brian L. Joiner, Barbara J. Streibel, *The Team Handbook* [Third Edition], (Madison, Wisconsin: Oriel Incorporated, 2003).

coursework so that new concepts learned in class will be explored first in the campus labs and second in the field under the direction of a laboratory technologist.

E. Table 4 addresses the assessment strategies to be utilized in this program.

Table 4: Student Formative and Summative Assessment

DOMAIN	FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT
Cognitive	• Course examinations- pass = 74% or above • Laboratory projects- pass = 80% mastery or above • Clinical projects- pass = 100% mastery or above	• Capstone Performance Assessment o A "C" or above in each course o Take the MT & CLT practice exams during the final semester and achieve a grade = to or higher than 5% below the national cut score o Present a portfolio of work achieved in the program to local clinical professionals & faculty
Psychomotor	• Students must demonstrate competency in all skills practiced in the lab. (85% efficiency) • Students must demonstrate competency in skills performed in the clinical settings. (85% efficiency)	• Exit Exam—Students will be required to perform a set of randomly selected skills to demonstrate continuing competence. • Students will be required to re-demonstrate previously learned skills at any time during the program.
Affective	• Student grading rubrics for all courses (didactic, laboratory, and clinical practice) will include a section addressing professionalism, attitudes, and work habits. • Student evaluations in clinical courses will include a section on interpersonal skills, attitudes, work habits and professionalism. • Faculty will conduct observations of student acquisition of collaborative skills during team and field activities.	• A summary assessment, compiling affective data gathered throughout the students' program will be conducted during the final semester. Results will be factored into outcomes of the other two domains of learning. Findings will be compared to the employer survey data to help fine-tune the assessment process of the program.

Section V: Finance

Table 5

Financial Analysis for All R401 Documents

Dixie State College MT Program	Year 1	Year 2	Year 3	Year 4	Year 5
Students					
Projected FTE Enrollment	12.0	24.0	24.0	24.0	24.0
Cost Per FTE	$ 34,698.00	$ 9,139.00	$ 9,143.00	$ 9,363.00	$ 9,380.00
Student/Faculty Ratio	6 to 1	12 to 1	12 to 1	12 to 1	12 to 1
Projected Headcount	12.0	24.0	24.0	24.0	24.0
Projected Tuition					
Projected Gross Tuition	$ 34728.00	$ 69456.00	$ 73623.00	$ 78040.00	$ 82723.00
Tuition Allocated to the Program	$ 8682.00	$ 17364.00	$ 18405.00	$ 19510.00	$ 20680.00
Student Lab Fees	$ 3600.00	$ 7200.00	$ 7200.00	$ 7200.00	$ 7200.00

5 Year Budget Projection

	Year 1	Year 2	Year 3	Year 4	Year 5
Expense					
Salaries & Wages	$ 140,000.00	$ 144,200.00	$ 148,526.00	$ 152,981.00	$ 157,571.00
Benefits	$ 57,500.00	$ 58,445.00	$ 59,418.00	$ 60,420.00	$ 61,453.00
Total Personnel					
Current Expense	$ 3,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00
Travel		$ 4,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00
Capital	$ 20,000.00				
Library Expense	$ 5,000.00	$ 2,500.00	$ 2,500.00	$ 2,500.00	$ 2,500.00
Total Expense	$ 225,500.00	$ 213,145.00	$ 218,444.00	$ 223,901.00	$ 229,524.00
Revenue					
Legislative Appropriation	$ 133,218.00	$ 108,581.00	$ 112,839.00	$ 138,000.00	$ 138,000.00
Grants (DRMC Donation)					
Reallocated Funds	$ 80,000.00	$ 80,000.00	$ 80,000.00	$ 59,191.00	$ 63,644.00
Tuition Allocated to the Program	$ 8,682.00	$ 17,364.00	$ 18,405.00	$ 19,510.00	$ 20,680.00
Other (Lab fees)	$ 3,600.00	$ 7,200.00	$ 7,200.00	$ 7,200.00	$ 7,200.00
Total Revenue	$ 225,500.00	$ 213,145.00	$ 218,444.00	$ 223,901.00	$ 229,524.00
Difference					
Revenue-Expense	$ -	$ -	$ -	$ -	$ -

Comments

The MT program will share equipment and library resources with the MLT program.

Funding Sources

The MT program will be funded through state appropriation, tuition, reallocated funds, donation, and lab fees. The 2008 Utah State Legislature awarded $400,000 ongoing Health Science initiative funding to DSC. The residual expense will come from cost savings and reallocation.

Reallocation

The MT program will be supported partially through internal reallocation. The source for the reallocated funds will be a previously existing Health Sciences account created by a Dixie Regional Medical Center donation for instruction in the health sciences.

Impact on Existing Budgets

No other program base budgets will be affected by costs for the Medical Technologist program.

APPENDIX A

Program Curriculum

Course Prefix and Number	Title	Credit Hours
Course Courses		
Tier I		
CLS 1110	Introduction to Clinical Laboratory Science	3
CLS 1115	Introduction to Clinical Laboratory Science Lab	1
CLS 1120	Principles of Clinical Hematology and Hemostasis	4
CLS 1125	Principles of Clinical Hematology and Hemostasis Lab	1
CLS 1155	Supervised Clinical Experience	1
CLS 2210	Principles of Clinical Chemistry I	4
CLS 2215	Principles of Clinical Chemistry I Lab	1
CLS 2310	Principles of Clinical Microbiology I	3
CLS 2315	Principles of Clinical Microbiology I Lab	1
CLS 2410	Principles of Clinical Chemistry II	4
CLS 2415	Principles of Clinical Chemistry II Lab	1
CLS 2510	Principles of Clinical Microbiology II	3
CLS 2515	Principles of Clinical Microbiology II Lab	1
CLS 2610	Principles of Clinical Immunohematology	3
CLS 2615	Principles of Clinical Immunohematology Lab	1
CLS 2715	Supervised Clinical Experience I	1
CLS 2815	Supervised Clinical Experience II	1
	Sub-total	34
Tier II		
CLS 3300	Advanced Clinical Lab Practices I	4
CLS 3310	Advanced Clinical Immunohematology	3
CLS 3320	Advanced Clinical Hematology and Hemostasis	4
CLS 3330	Advanced Clinical Chemistry	3
CLS 3340	Advanced Clinical Microbiology	3
CLS 4410	Clinical Correlation	1
CLS 4435	Supervised Clinical Experience I	1
CLS 4450	Supervised Clinical Experience II	1
CLS 4800	Research Projects in CLS	1
	Sub-total	21
General Education Courses		
Tier I		
ENGL 1010	Introduction to Writing	3
LIB 1010	Information Literacy	1
ENGL 2010	Intermediate Writing	3
COMM 2110	Interpersonal Communication	3

BIOL 1610/1615	Principles of Biology	5
BIOL 2420/2425	Human Physiology/Lab	4
BIOL 2060/2065	Introduction to Microbiology/Lab	4
MATH 1050	College Alg/Pre-Caclulus	4
CHEM 1210/1215	Principles of Chemistry I/Lab	5
CHEM 1220/1225	Principles of Chemistry II/Lab	5
	Sub-total	37
Tier II		
BIOL 2030	Principles of Genetics	4
BIOL 3450	Medical Microbiology	4
BIOL 3455	Medical Micro Lab	1
BIOL 3470	Intro to Immunology	3
BIOL 4230	General Parasitology	3
BIOL 4235	General Parasitology Lab	1
CHEM 2310	Organic Chemistry I	4
CHEM 2315	Organic Chemistry I Lab	1
CHEM 2320	Organic Chemistry II	4
CHEM 2325	Organic Chemistry II Lab	1
PHYS 2010	College Physics I	4
PHYS 2015	College Physics I Lab	1
PHYS 2020	College Physics II	4
PHYS 2025	College Physics II Lab	1
HU/CA/SS	General Education	3
HU/CA/SS	General Education	3
American Institutions	General Education	3
HU/CA/SS	General Education	3
	Sub-total	48
	Total number of credits	140

Course Descriptions for the MT Program

CLS 1110 Introduction to Clinical Laboratory Science (3)
Principles and applications to laboratory testing including safe practices for the laboratory practitioner, specimen quality assurance, phlebotomy, urinalysis, basic concepts in clinical immunology, and clinical approaches to immunological testing are introduced.

CLS 1115 Introduction to Clinical Laboratory Science Laboratory (1)
Laboratory session addresses the principles and applications to laboratory testing including safe practices for the laboratory practitioner, specimen quality assurance, phlebotomy, urinalysis, basic concepts in clinical immunology, and clinical approaches to immunological testing.

CLS 1120 Principles of Clinical Hematology and Hemostasis (4)
Fundamental theories of hematopoesis, routine laboratory evaluation of blood components using standard instrumentation and microscopic methods, including safety and quality control theories of hemostatis and introduction to abnormal hematology.

CLS 1125 Principles of Clinical Hematology and Hemostasis Laboratory (1)
Microscopic and instrumental approach to routine evaluations of hematology and Hemostasis.

CLS 1155 Supervised Clinical Experience (1)
Off-campus supervised clinical experiences administered in conjunction with clinical faculty in DSC affiliated health care institutions. Prerequisite: CLS 1110, 1115, 1120 and 1125

CLS 2210 Principles of Clinical Chemistry I (4)
Basic concepts and techniques in clinical chemistry and quality control utilizing manual and automated laboratory procedures. Emphasis on blood and body fluid assessments of carbohydrates, bilirubin, non-protein nitrogen testing and electrolyte acid/base balance. Prerequisite: Chem 1110, 1115 and Math 1040.

CLS 2215 Principles of Clinical Chemistry I Laboratory (1)
Basic laboratory techniques in clinical chemistry and quality control using manual and automated procedures. The laboratory portion provides direct analytical interaction with the procedures. Provides basic laboratory mathematics and quality control in a practical setting.

CLS 2310 Principles of Clinical Microbiology I (3)
This course provides an in-depth coverage of clinically significant bacteria including epidemiology, pathogenicity, procedures for traditional laboratory identification.

CLS 2315 Principles of Clinical Microbiology I Laboratory (1)
The laboratory provides practical identification of clinically significant bacteria. Specific procedures for identification are introduced and practiced.

CLS 2410 Principles of Clinical Chemistry II (4)
Continuation of CLS 2210 with the introduction to methods for the assessment of proteins, lipids, enzymology, therapeutic drug monitoring, toxicology and basic endocrinology. Prerequisite: CLS 2210.

CLS 2415 Principles of Clinical Chemistry II Laboratory (1)
The lab portion of this course provides specific practical applications to each of the assessment of proteins, lipids, enzymology, therapeutic drug monitoring, toxicology and basic endocrinology.

CLS 2510 Principles of Clinical Microbiology II (3)
This course is a continuation of CLS 2315 including, clinical mycology, virology, parasitology and miscellaneous clinical bacteria. Prerequisites: CLS 2315, BIOL 2060 and BIOL 2065

CLS 2515 Principles of Clinical Microbiology II Laboratory (1)
Focus of the laboratory is to provide practical identification of clinically significant fungi, viruses and parasites. Both morphologic and serological determinations will be presented.

CLS 2610 Principles of Clinical Immunohematology (3)
Lecture covering the theory and principles of Immunohematology relevant to blood group serology, antibody detection and identification, compatibility testing, component preparation and therapy in blood transfusion service, quality control parameters, donor screening and phlebotomy, transfusion reactions and hemolytic disease of the newborn. Prerequisite: CLS 1110.

CLS 2615 Principles of Clinical Immunohematology Laboratory (1)
Laboratory covering the practical aspects relevant to blood group serology, antibody detection and identification, compatibility testing and quality control parameters. Donor and component preparation, screening and phlebotomy will be handled in cooperation with the Red Cross Blood Services.

CLS 2715 Supervised Clinical Experience I (1)
Off-campus supervised clinical experiences administered in conjunction with clinical faculty in DSC affiliated health care institutions. Prerequisite: CLS 1110, 1115, 1120 and 1125.

CLS 2815 Supervised Clinical Experience II (1)
Off campus supervised clinical experiences administered in conjunction with clinical faculty in DSC affiliated health care institutions. Prerequisites: CLS 2210, 2215, 2310, 2315, 2410, 2415, 2510, 2515, 2610, and 2615.

CLS 3300 Advanced Clinical Laboratory Practices I (4)
Advanced theory to include laboratory instrument systems comparison, evaluation, and CLIA 88 validation procedures with emphasis on scientific research design and statistical analysis. Interrelated topics in the clinical laboratory sciences to include educational strategies for laboratory personnel, approaches to work-load management, budgeting and marketing strategies for laboratory services. Students also learn about and evaluate the new diagnostic technology available to clinical laboratories, as well as learning how to select, evaluate, design, perform, and document CLIA-88 acceptable validations studies on new chemistry instrumentation or analytical methods. Interrelated topics in the clinical laboratory to include workload management, designing and implementing standards for quality assurance, budgeting laboratory operations, and investigative concepts related to new method and instrument evaluation, selection, and validation.

CLS 3310 Advanced Clinical Immunohematology (3)
Advanced blood banking theory and specialized procedures as they pertain to transfusion, quality assurance and regulatory issues pertaining to Transfusion Medicine. Prerequisite: CLS 2610.

CLS 3320 Advanced Clinical Hematology and Hemostasis (4)
Correlation of clinical laboratory hematology and hemostasis with emphasis on hematopathology specialized procedures and hematological abnormalities in human cellular components. Routine and specialized coagulation procedures will also be used to detect hemorrhagic and trombotic problems. Prerequisite: CLS 1120.

CLS 3330 Advanced Clinical Chemistry (3)
This problem-solving oriented course presents the correlation of clinical chemistry test results to organ-related diseases, such as renal, hepatic, and endocrine diseases. The students will learn how to use clinical correlation as a quality assurance tool to detect patient testing errors. Students also learn about and evaluate the new diagnostic technology available to clinical laboratories, as well as learning how to select, evaluate, design, perform, and document CLIA-88 acceptable validations studies on new chemistry instrumentation or analytical methods. Interrelated topics in the clinical laboratory to include workload management, designing and implementing standards for quality assurance, budgeting laboratory operations, and investigative concepts related to new method and instrument evaluation, selection, and validation. Additionally, Therapeutic Drug Monitoring and Toxicology studies are presented. Prerequisites: Acceptance into the CLS Program, and completion of CLS 3300 (Advanced Clinical Laboratory Practices).

CLS 3340 Advanced Clinical Microbiology (3)
A comprehensive study of clinical bacteriology, using the culture site approach, including laboratory identification of pathogens by traditional manual methods. This course will also examine applications of clinical diagnostic molecular biology of infectious microorganism using current and evolving methodologies. Prerequisites/Co-requisites: BIOL 3450.

CLS 4410. Clinical Correlation (1)
Physician guided correlation between laboratory data and patient diagnosis.

CLS 4435. Supervised Clinical Experience I (1)
Off campus supervised clinical experiences administered in conjunction with clinical faculty in DSC affiliated health care institutions. Emphasis on experiences associated with laboratory administrative functions. Prerequisites: CLS 3310, 3320, 3330 and 3340.

CLS 4450. Supervised Clinical Experience II (1)
Off campus supervised clinical experiences administered in conjunction with clinical faculty in DSC affiliated health care institutions. Emphasis on experiences associated with laboratory administrative functions. Prerequisites: CLS 3310, 3320, 3330 and 3340

CLS 4800. Research Projects in Clinical Laboratory Sciences (1-3)
This course involves an original research project of the student's design in an area relevant to the clinical laboratory sciences. Students will prepare a grant application for funding and will write an IRB (Institutional Review Board) application. After completing the research project, the students will present their findings in a poster and oral format at a symposium and -a state CLS conference. Prerequisites: CLS 3310, CLS 3320, CLS 3330, and CLS 3340.

APPENDIX B

Program Schedule for the MT Degree

Tier I

(MLT Program)

Course Number	Title	Credit Hours
	Cohort Semester I	
CHEM 1210/1215	Principles of Chemistry I	5
CLS 1110/1115	Introduction to Clinical Laboratory Science/Lab	4
BIOL 1610/1615	Principles of Biology/Lab	5
MATH 1050	College Alg/Pre-Calculus	4
	TOTAL CREDITS	18
	Cohort Semester II	
CHEM 1220/1225	Principles of Chemistry II	5
CLS 1120/1125	Principles of Clinical Hematology and Hemostasis/Lab	5
BIOL 2420/2425	Human Physiology/Lab	4
ENGL 1010	Introduction to Writing	3
LIB 1010	Information Literacy	1
	TOTAL CREDITS	18
	Cohort Semester III	
CLS 2210/2215	Principles of Clinical Chemistry I	5
CLS 2310/2315	Principles of Clinical Microbiology I	4
BIOL 2060/2065	Introduction to Microbiology/Lab	4
ENGL 2010	Intermediate Writing	1
	TOTAL CREDITS	17
	Cohort Semester IV	
CLS 2410/2415	Principles of Clinical Chemistry II	5
CLS 2510/2515	Principles of Clinical Microbiology II	4
CLS 2610/2615	Principles of Clinical Immunohematology	4
CLS 2715	Supervised Clinical Experience I	1
CLS 2815	Supervised Clinical Experience II	1
COMM 2110	Interpersonal Communication	3
	TOTAL CREDITS	18
TIER I	**TOTAL TIER CREDITS**	**71**

Tier II

Course Number	Title	Credit Hours
	Cohort Semester V	
CLS 3300	Advanced Clinical Lab-- Practices I	4
BIOL 2030	Principles of Genetics	4
PHYS 2010	College Physics I	4
PHYS 2015	College Physics I Lab	1
CHEM 2310	Organic Chemistry I	4
CHEM 2315	Organic Chemistry I Lab	1
	TOTAL CREDITS	18
	Cohort Semester VI	
PHYS 2020	College Physics II	4
PHYS 2025	College Physics II Lab	1
HU/CA/SS	General Education	3
HU/CA/SS	General Education	3
American Institutions	General Education	3
CHEM 2320	Organic Chemistry II	4
CHEM 2325	Organic Chemistry II Lab	1
	TOTAL CREDITS	19
	Cohort Semester VII	
CLS 3310	Advanced Clinical Immunohematology	3
CLS 3320	Advanced Clinical Hematology and Hemostasis	4
CLS 4435	Supervised Clinical Experience I	1
BIOL 3470	Intro to Immunology	3
BIOL 4230	General Parasitology	3
BIOL 4235	General Parasitology Lab	1
HU/CA/SS	General Education	3
	TOTAL CREDITS	18
	Cohort Semester VIII	
CLS 3330	Advanced Clinical Chemistry	3
CLS 3340	Advanced Clinical Microbiology	3
CLS 4410	Clinical Correlation	1
CLS 4450	Supervised Clinical Experience II	1
BIOL 3450	Medical Microbiology	4
BIOL 3455	Medical Micro Lab	1
CLS 4800	Research Projects in CLS	1
	TOTAL CREDITS	14
TIER II	**TOTAL TIER CREDITS**	**69**
	TOTAL DEGREE CREDIT HOURS	**140**

APPENDIX C

Faculty

At this writing, specific full time and adjunct MT faculty have not been identified. As previously mentioned however, the community has a rich supply of physicians and clinical science professionals who are a potential source for adjunct instruction in the MT program. The following is a list of current faculty at DSC who will be able to support the general education requirements of the MT program:

Diane Albertini, MA, Associate Professor English
Patti Allen, MA, DVM, Professor of Life Sciences
Brad Barry, PhD, Professor of English
Sarah Black, MS, Associate Professor of Chemistry
Terre Burton, MA, Associate Professor of English and Humanities
Timothy Bywater, PhD, Professor of English
AmiJo Comeford, PhD, Assistant Professor of English
Robert Cowan, PhD, Assistant Professor of Chemistry
Ross Decker, MA, Associate Professor of Mathematics
David Feller, PhD, Professor of Chemistry
Kristin Hunt, PhD, Assistant Professor of Communication
David Jones, MS, Assistant Professor of Biology
Linda Jones, MA, MLS, Assistant Librarian
Thomas McNeilis, MS, DO, Assistant Professor of Biology
Bonnie Percival, MA, MLS, Associate Librarian
Steven Sullivan, MS, Associate Professor of Physics
Donald Warner, PhD, Assistant Professor of Biology
Eric Young, MEd, Assistant Professor of Communication

APPENDIX D

Library and Laboratory Resources

Reference Material

Betty A. Forbes, Daniel F. Sahm, Alice S. Weissfeld, *Bailey & Scott's, Diagnostic Microbiology* (Diagnostic Microbiology Bailey), 2007. ISBN 0323030653 $100.00

Robert W Colman (Editor), Victor J Marder (Editor), Alexander W, *Clowes Hemostasis and Thrombosis:Basic Principles and Clinical Practice,* 2003. ISBN 0781749964 $359.00

ASCP Board of Registry (Editor), Barbara M. Castleberry (Editor), Mary E.,, *Board of Registry Study Guide: Clinical Laboratory Certification ,* 1996. 0891894160 $50.00

Connie R. Mahon (Author), George Manuselis (Author), Donald C. Lehman, *Textbook of Diagnostic Microbiology* (Hardcover), 2006. ISBN 1416025812 $99.00

Carl A. Burtis, Edward R. Ashwood, & David E. Bruns Tietz, *Fundamentals of Clinical Chemistry*, 6th Edition, 2007. ISBN 9780721638652 $97.00

Bruns Tietz, David, *Textbook of Clinical Chemistry and Molecular Diagnostics*, 4th Edition , 2008. ISBN 9780721601892 $97.00

Christopher D. Hillyer (Author), Leslie E. Silberstein (Author), Paul M. Ness, *Blood Banking and Transfusion Medicine: Basic Principles and Practice,* 2006. ISBN 0443069816 $199.00

Denise M. Harmening, *Clinical Hematology and Fundamentals of Hemostasis*, 2008. ISBN 0803617321 $92.00

Denise M. Harmening, *Modern Blood Banking and Transfusion Practices,* 2005. ISBN 0803612486 $83.00

Douglas C Tkachuk and Jan V Hirschmann, *Wintrobe's Atlas of Clinical Hematology,* 2006. ISBN 0781770238 $215.00

Elmer W. Koneman, *Koneman's Color Atlas and Textbook of Diagnostic Microbiology* (Color), 2005. ISBN 0781730147 $100.00

George F. Brooks, *Medical Microbiology*, 24th edition, 2007. ISBN 0071476660 $50.00

Jeffery McCullough, *Transfusion Medicine*, 2006, ISBN 0443066485 $72.00

John G. Webster (Editor), *Medical Instrumentation: Application and Design* (Paperback), 1997. ISBN 0471153680 $100.00

John L. Carey III, MD; J. Philip McCoy Jr, PhD; David F. Keren, MD, *FASCP Flow Cytometry in Clinical Diagnosis* (4th edition), 2008. ISBN 9780891895480 $155.00

John T. Sullivan*, A Color Atlas of Parasitology*, 7th Edition (Spiral-bound), 2007. ISBN 0966580761 $44.00

Kathy D. Blaney & Paula R. Howard, *Basic and Applied Concepts of Immunohematology*, 2nd Edition, 2008. ISBN 9780323048057 $61.00

Larry Roberts, Jr.,John Janovy, P. Schmidt, *Foundations of Parasitology* (Hardcover), 2004. ISBN 0072348984 $125.00

Lawrence A Kaplan, Amadeo J Pesce and Steven Kazmierczak, *Clinical Chemistry Theory, Analysis, Correlation,* 4th Edition, 2002 ISBN 9780323017169 $100.00

Lorraine J. Doucette*, Mathematics for the Clinical Laboratory* (Paperback), 1997, ISBN 0721644589 $45.00

Lynne Shore Garcia, *Diagnostic Medical Parasitology* (Hardcover), 2006 ISBN 1555813801 $160.00

Marshall Lichtman, Ernest Beutler, Kenneth Williams, *Hematology,* Seventh Edition, 2005. ISBN 0070703973 $215.00

Mary Louise Turgeon*, Immunology & Serology in Laboratory Medicine (Immunology & Serology,* 2008. ISBN 0323043828 $65.00

Nancy A. Brunzel, *Fundamentals of Urine and Body Fluids,* 2004 ISBN 0721601782 $58.00

Patrick R., Ph.D. Murray, Ellen Jo Baron, James H. Jorgensen, et al., *Manual of Clinical Microbiology* (2 Volume Set) (Hardcover), 2007. ISBN 1555813712 $209.00

Richard A. McPherson and Matthew R. Pincus, *Henry's Clinical Diagnosis and Management by Laboratory Methods,* 2006. ISBN 1416002871 $140.00

Ruth E McCall (Author), Cathee M Tankersley, *Phlebotomy Essentials* (Paperback), 2007. ISBN 0781761387 $58.00

Shauna Anderson, Susan Cockayne, *Clinical Chemistry: Concepts and Applications,* 2007. ISBN 1577665147 $72.00

Shauna C Anderson and Keila B Poulsen, *Anderson's Atlas of Hematology,* 2003. ISBN 078172662X $63.00

Sister Laurine Graff, *A Handbook of Routine Urinalysis,* 1983. ISBN 0397521111 $56.00

Susan King Strasinger, Marjorie Schaub Di Lorenzo, *Urinalysis and Body Fluids* (Paperback), 2008. ISBN 080361697X $59.00

William E. Dismukes (Editor), Peter G. Pappas (Editor), Jack D. Sobel (Editor), *Clinical Mycology* (Hardcover), 2003 ISBN 0195148096 $155.00

Periodicals

American Journal of Clinical Pathology	ASCP	ISSN 0002-9173	$650.00
Blood	American Society of Hematology	ISSN 1528-0020	$1,220.00
Clinical Chemistry	AACC	ISSN: 1530-8561	$1,061.00
Journal of Analytical Toxicology	Preston Publications	ISSN 0146-4760	$630.00
Journal of Clinical Microbiology	ASM		$573.00
Laboratory Medicine	ASCP	ISSN 0007-5027	$115.00
Transfusion	AABB	Online-ISSN: 1537-2995	$639.00
		Total	**$8441.00**

Suggested Instrumentation for the MT Program

Description	Quantity	Unit Price	Extended Price
Hematology Counter	1	$20,000.00	$ 20,000.00
Immuno Assay Analyzer	1	$10,000.00	$10,000.00
Chemistry Instrument	1	$20,000.00	$20,000.00
Coagulation Instrument	1	$ 5,000.00	$ 5,000.00
Microscopes	24	$ 800.00	$19,200.00
Electrophoresis chamber –Cellulose Acetate	1	$ 1,300.00	$ 1,300.00
Spectrophotometer	2	$ 5,500.00	$11,000.00
Centrifuge	3	$ 4,000.00	$12,000.00
Serofuge	2	$ 3,100.00	$ 6,200.00
Slide Stainer	1	$ 3,000.00	$ 3,000.00
Osmometer	1	$ 5,000.00	$ 5,000.00
Hemocytometer	3	$ 320.00	$ 960.00
Gas Chromatograph-FID/NPD	1	$23,000.00	$23,000.00
Incubator 37 C	2	$ 3,000.00	$ 6,000.00
Refrigerator	2	$ 5,400.00	$10,800.00
Incinerators	12	$ 300.00	$ 3,600.00
Freezer - 25C	2	$ 4,960.00	$9,920.00
Biological Hood	1	$11,500.00	$11,500.00
Chemical Hood	1	$ 7,500.00	$ 7,500.00
Heat Blocks	5	$ 1,100.00	$5,500.00
Safety Cabinet	1	$ 2,000.00	$ 2,000.00
Vortex Mixers	6	$ 1,000.00	$ 6,000.00
Pipettors	10	$ 304.00	$ 3,040.00
Total			**$202,520.00**

APPENDIX E

Course Comparison between Weber State and Dixie State MT Programs

Weber State Program			Dixie State Program		
Course Number	**Course Name**	**Credit**	**Course Number**	**Course Name**	**Credit**
TIER I	**Freshman Fall**			**MLT Program**	
CHEM PS/SI 1110	Elementary Chemistry	5	CHEM 1210	Principles of Chemistry I	4
			CHEM 1215	Principles of Chemistry I Lab	1
CLS 1113/1113L	Introduction to Clinical Laboratory Practice	4	CLS 1110	Introduction to Clinical Laboratory Practice	3
			CLS 1115	Intro to Clinical Lab Practice Lab	1
HTHSCI 1110	Biomedical Core	4	BIOL 2320	Human Anatomy	4
			BIOL 2325	Human Anatomy Lab	1
Gen Ed	Gen Ed	3	MATH 1050	Coll Alg/Pre-Calculus	4
	Total Hours	16		Total Hours	18
Freshman Spring					
CHEM 1120	Elementary Organic/Biochemistry	5	CHEM 1220	Principles of Chemistry I	4
			CHEM 1225	Principles of Chemistry I Lab	1
CLS 1123/1123L	Principles of Clinical Hematology and Hemostasis	5	CLS 1120	Principles of Clinical Hematology and Hemostasis	4
			CLS 1125	Principles of Clinical Hematology and Hemostasis Lab	1
HTHSCI 1111	Biomedical Core	4	BIOL 2420	Human Physiology	3
			BIOL 2425	Human Physiology Lab	1
Gen Ed	General Education	3	Gen Ed	General Education	3
	Total Hours	17		Total Hours	17

Weber State Program			Dixie State Program		
Sophomore Fall					
CLS 2211/2211L	Principles of Clinical Chemistry I	5	CLS 2210	Principles of Clinical Chemistry I	4
			CLS 2215	Principles of Clinical Chemistry I Lab	1
CLS 2212/2212L	Principles of Clinical Microbiology I	4	CLS 2310	Principles of Clinical Microbiology I	3
			CLS 2315	Principles of Clinical Microbiology I Lab	1
CLS 1154	Supervised Clinical Experience First Year	1	CLS 1155	Supervised Clinical Experience	1
MICR 1113	Principles of Microbiology	3	BIOL 2060	Introduction to Microbiology	3
			BIOL 2065	Introduction to Microbiology Lab	1
ENGL 1010	Introduction to Writing	3	ENGL 1010	Introduction to Writing	1
Gen Ed	General Education	3	Gen Ed	General Education	3
	Total Hours	19		Total Hours	18
Sophomore Spring					
CLS 2213/2223L	Principles of Clinical Chemistry II	5	CLS 2410	Principles of Clinical Chemistry II	4
			CLS 2415	Principles of Clinical Chemistry II Lab	1
CLS 2214/2214L	Principles of Clinical Microbiology II	4	CLS 2510	Principles of Clinical Microbiology II	3
			CLS 2515	Principles of Clinical Microbiology II Lab	1
CLS 2215/2215L	Principles of Clinical Immunohematology	4	CLS 2610	Principles of Clinical Immunohematology	3
			CLS 2615	Principles of Clinical Immunohematology	1
CLS 2256	Supervised Clinical Experience	1	CLS 2715	Supervised Clinical Experience	1
CLS 2257	Supervised Clinical Experience	1	CLS 2815	Supervised Clinical Experience	1
ENGL 2010	Intermediate Writing	3	ENGL 2010	Intermediate Writing	3
	Total Hours	18		Total Hours	18
Total Program Credit. Hours		**70**	**Total Program Credit. Hours**		**71**
Completion of Tier I – Associate of Applied Science Degree-- MLT Program					

Weber State Program			Dixie State Program		
TIER II	**Junior Year Fall**		**MT Program**		
CLS 3302/3302L	Advanced Clinical Lab Practices I	4	CLS 3300	Advanced Clinical Lab Practices I	4
ZOOL 3300	Genetics	4	BIOL 2030	Principles of Genetics	4
PHYS PS/SI 2010	College Physics I	5	PHYS 2010	College Physics I	4
			PHYS 2015	College Physics I Lab	1
CHEM 2310	Organic Chemistry	5	CHEM 2310	Organic Chemistry I	4
			CHEM 2315	Organic Chemistry I Lab	1
	Total Hours	18		Total Hours	18
Junior Year Spring					
PHYS SI2020	College Physics II	5	PHYS 2020	College Physics II	4
			PHYS 2025	College Physics II Lab	1
HU/CA/SS	General Education	3	HU/CA/SS	General Education	3
HU/CA/SS	General Education	3	HU/CA/SS	General Education	3
American Institutions	General Education	3	American Institutions	General Education	3
CHEM 2320 or CHEM 3070	Organic Chemistry II or Biochemistry	5/4	CHEM 2320	Organic Chemistry II	4
			CHEM 2325	Organic Chemistry II Lab	1
	Total Hours	18/19		Total Hours	19

Weber State Program			Dixie State Program		
Senior Year Fall					
CLS 3311	Advanced Clinical Immunohematology	3	CLS 3310	Advanced Clinical Immunohematology	3
CLS 3313	Advanced Clinical Hematology and Hemostasis	4	CLS 3320	Advanced Clinical Hematology and Hemostasis	4
CLS 4453	Supervised Clinical Experience I	1	CLS 4435	Supervised Clinical Experience I	1
MICR 3254	Immunology	5	BIOL 3470	Introduction to Immunology	3
			BIOL 4230	General Parasitology	3
			BIOL 4235	General Parasitology Lab	1
HU/CA/SS	General Education	3	HU/CA/SS	General Education	3
	Total Hours	16		Total Hours	18
Senior Year Spring					
CLS SI3314	Advanced Clinical Chemistry	3	CLS 3330	Advanced Clinical Chemistry	3
CLS 3316	Advanced Clinical Microbiology	3	CLS 3340	Advanced Clinical Microbiology	3
CLS 4409	Clinical Correlation	1	CLS 4410	Clinical Correlation	1
CLS 4454	Supervised Clinical Experience II	1	CLS 4450	Supervised Clinical Experience II	1
MICR 3305	Medical Microbiology	5	BIOL 3450	Medical Microbiology	4
			BIOL 3455	Medical Micro Lab	1
CLS 4801	Research Projects in CLS	1	CLS 4800	Research Projects in CLS	1
	Total Hours	14		Total Hours	14
Total Tier II Credit Hours		**67/68**	**Total Tier II Credit Hours**		**69**
Total Program Credit Hours		**137/138**	**Total Program Credit Hours**		**140**
Completion of Tier II – Baccalaureate of Science Degree-- MT Program					

Institutional Signatures

Institution Submitting Proposal: Dixie State College of Utah

School: Science and Allied Health

Department: Medical Laboratory Science

Program Title: Medical Technologist

Recommended Classification of Instructional Programs (CIP) Code: 51.1005

Degree(s) to be Awarded: Bachelor of Science

Proposed Beginning Date:

Institutional Signatures:

_____, President
Stephen Nadauld

_____, Chief Academic Officer
Donna Dillingham-Evans

_____, Dean
Victor Hasfurther

_____, Associate Dean
Carole Grady

Date ___/___/___