Southwest Tennessee Community College
Memphis, Tennessee

ACADEMIC AUDIT

Architectural/Construction Fundamentals

SELF STUDY REPORT

Submitted to the Tennessee Board of Regents
For an Academic Audit Review

Engineering Technologies
Southwest Tennessee Community College
5983 Macon Cove
Memphis, Tennessee 38103

January 29, 2010
I. INTRODUCTION

In 2003 the Engineering Technologies department identified a need to offer students the option to obtain a technical certificate in Architectural/Construction Fundamentals. The certificate option would benefit students who wished to receive training in a shorter period of time than that required by the associate degree program. A technical certificate offering classes that would transfer into the existing two-year Architectural Engineering Technology (ARCH) associate degree was proposed. An exploratory survey of the proposed technical certificate sent out to the architectural and construction industry established a need. The enormous responses from the industry in favor of the technical certificate permitted the department to move forward in obtaining formal approval for the certificate program. The ARCH associate degree with its Accreditation Board for Engineering and Technology (ABET) certification provides the quality assurance basis for the certificate. This technical certificate trains technicians for the architectural and construction industry. The certificate program also provides retraining opportunities for employed technicians.

The Architectural/Construction Fundamentals Technical Certificate Program began in 2004 and currently serves the southwest Tennessee area, greater Memphis metropolitan area, northern Mississippi area, and western Arkansas area. Certificate holders typically work as technicians with architects, engineers, building component manufacturers, real estate developers, facility managers, commercial and service industries, residential and commercial contractors, and government agencies. The Architectural/Construction Fundamentals Certificate Program emphasizes the basic skills needed for a person beginning a career in architecture and building construction. Designed for high school graduates or those entering the design and construction field for the first time, the program covers six important areas. These areas include engineering technology techniques, architectural drawings, surveying, computer aided drawing, the materials and methods of building construction, and the use of modern computer software including word processing, spreadsheets, and databases.

Students who complete this certificate program will be qualified to enter the Cooperative Education (Co-op) Program and/or entry-level positions in the design and civil/construction fields. The purpose of the Co-op Program is to train students in these fields, combining classroom with actual work experience. Many employers participating in the Co-op program provide tuition for those who wish to continue an education.

Since the inception of the certificate in 2004, the program has awarded forty six certificates. The fall 2009 enrollment consisted of fifteen students. Detailed enrollment data is presented in Appendix 3. This certificate acts as a stepping stone incentive for many students who go on to continue their educational goals and seek the Architectural Engineering Technology associate degree.
II. OVERALL PERFORMANCE

The Architectural/Construction Fundamentals Technical Certificate (TCAN) builds its structure and strength upon outcome based coursework from the Architectural Engineering Technology (ARCH) program. The ARCH program recently received a full six year accreditation from the Accreditation Board for Engineering and Technology (ABET). ABET accreditation assures that the ARCH program meets the quality standards recognized by the engineering profession. In adhering to ABET standards, the ARCH program uses a documented process incorporating appropriate data to regularly assess its program educational objectives and program outcomes. The Architectural Engineering Technology’s ABET accreditation also provides useful feedback on curriculum content because five of the courses in the TCAN program are also included in the Architectural Engineering Technology degree. Shared courses include INET 1004, ARCH 1124, ARCH 1244, ARCH 2644, and CCET 1010.

The learning objectives for the TCAN program are based on the learning objectives TAC/ABET looks for in architectural engineering technology programs. Also taken into consideration in determining learning outcomes for the program are industry standards and input from employers and graduates. Student learning objectives are flexible and are periodically reviewed by the program faculty and the Advisory Committee for possible revisions.

This program primarily utilizes traditional lecture/lab offerings with classes offered days and evenings to accommodate both the traditional and non-traditional students’ schedules. Instructors utilize videos, professional society websites, local industry websites and actual industry projects to stimulate and enhance student learning. Applied problem solving, critical thinking, and hands-on technology application are integrated throughout the courses through a variety of methods including classroom instruction, laboratory work, and outside-of-class assignments. Through the use of laboratory equipment, students get hands-on experience to prepare them for employment in industry.

The TCAN program has incorporated the use of a 4 column model for listing: (1) program objectives, (2) assessment methods tied to the individual objectives, (3) assessment results, and (4) use of the assessment results in closing the loop. Documentation of the continuous improvement process for the program has been both improved and simplified through the use of the 4 column model. Assessments are used for program improvement.

One improvement need identified through the process of this self-study and through the ABET review of the associate degree program was for the incorporation of more standardized American Society for Testing and Materials (ASTM) testing into the courses. Performing ASTM tests on materials would further reinforce for students the scientific principles that have been examined in the classroom.
III. PERFORMANCE BY FOCAL AREA

The purpose of this section is to address education quality processes related to the Architectural/Construction Fundamentals Technical Certificate (TCAN) program at Southwest Tennessee Community College. This section describes the processes in which faculty draw upon evidence to assess strengths, weaknesses and needs associated with the program in an effort to produce, assure, and regularly improve the quality of teaching and learning. Initiatives and recommendations for improvement to address identified needs are presented in the related focal areas.

Focal Area 1: Learning Objectives

1.1 Process for Developing Program Learning Objectives

Student learning objectives have been explicitly defined for each course in the program and are listed on the standardized course syllabi (to be made available for review by the on-site team). Five of the six courses which make up the certificate program are also required for the associate degree program in Architecture and therefore meet the strict guidelines of Accreditation Board for Engineering and Technology (ABET). For these five courses, student skills and course outcomes are carefully defined by ABET and are based on industry needs. Course objectives which are deemed as most important for a student’s later success in the field make up the program objectives. In choosing the program objectives, what a student should think, know, or be able to do as a result of completion of the program is considered. Each student learning objective is written in such a way as to be specific, time-based and measurable. Program learning objectives and the corresponding assessment plan are included in Appendix 6.

The program demonstrates strength in the area of developing learning objectives through the involvement of the advisory board and the adherence to ABET criteria.

1.2 Evidence-Based Learning Objectives

In the TCAN program the current student learning objectives have been developed based on several sources of data. Program surveys from employers and alumni/graduates were used in conjunction with Career Services’ surveys to utilized when the original student learning objectives were developed. These surveys provided information on employment status and the adequacy of education. Information obtained from advisory board meetings was also compiled and utilized.
The learning objectives for the TCAN program are based on the learning objectives TAC/ABET looks for in architectural engineering technology programs. Five of the six courses are part of the TAC/ABET accredited associate degree program. The remaining course follows the same standards and guidelines as those created by TAC/ABET.

In considering industry standards, in making changes in outcomes based on feedback from employers and graduates, and through reliance on research based ABET guidelines, the learning outcomes are considered to be based on evidence. Student learning objectives are flexible and are periodically reviewed by the program faculty and the Advisory Committee for possible revisions. Proposed modifications to the objectives are carefully scrutinized to determine the continuous improvement value of the changes and to ensure that the objectives maintain reasonable alignment with the expectations of industry. One improvement need that has been identified for the program is a regular review of ABET guidelines for the purpose of maintaining current outcomes for the six courses in the certificate program.

1.3 Best Practices for Learning Objectives

In making use of best practices in the field, faculty members review web-based material detailing program content, course syllabi, and learning outcomes from other institutions for transfer credit analysis. Formal guidance concerning program structure or curriculum content occurs through advisory meetings with the University of Memphis and from professional societies including the American Congress on Surveying and Mapping (ACSM), the Tennessee Association of Professional Surveyors (TAPS), and the American Institute of Architects (AIA). Additional best practice information came from curriculum review work with Sinclair Community College and Ivy Community College, both in Ohio. The accreditation process with ABET provides additional valuable best practice information in the area of engineering.

Improvement Needs for Focal Area 1

Evaluate the updated ABET Criteria for Accrediting Engineering Technology Programs and incorporate any new or revised learning outcomes into the TCAN courses.

Focal Area 2: Curriculum and Co-Curriculum

2.1 Faculty Collaboration on Curriculum Design and Improvement

Recent program initiatives brought about when the ABET self-study was undertaken was the action of incorporating more written and oral communication into the courses. This action affected five of the six TCAN courses. Social and global imperatives such as sustainability and green technology have also necessitated changes in the TCAN curriculum course content. Any change in curriculum is made following formal discussions of all program or departmental
faculty and with input from the advisory committee. One concern raised during the ABET reaffirmation of accreditation was the need for more standardized testing of materials and this was incorporated into one of the TCAN courses, ARCH 1244 Material and Methods. As discussed in Section 2.2, the program would benefit from additional standardized testing being added to courses in the curriculum. As Computer Aided Drawing (CAD) technology and 3D modeling became more main-stream, new object based modeling and building information modeling (BIM) was incorporated into current CAD coursework. Faculty have collaborated to meet these improvements dictated by industry changes and have incorporated the updates into their respective courses. Faculty also collaborated on the development of standardized assessment tools such as oral and written grading rubrics.

2.2 Course Content and Sequencing to Achieve Learning Objectives

Since all of the courses in the certificate program are introductory courses, there is no pre-determined order for a student’s completion of the six courses. Course content is delivered in such a way as to place emphasis on the learning objectives for each course. The Architectural Engineering Technology’s ABET accreditation also provides useful feedback on curriculum content because five of the courses in the TCAN program are also included in the Architectural Engineering Technology degree. Shared courses include INET 1004, ARCH 1124, ARCH 1244, ARCH 2644, and CCET 1010.

As discussed previously, one improvement need identified through the process of this self-study and through the ABET review of the associate degree program was for the incorporation of more standardized American Society for Testing and Materials (ASTM) testing into the courses. ASTM International is one of the largest voluntary standards development organizations in the world- a trusted source for technical standards for materials, products, systems, and services. Knowledge and practice using various applicable ASTM tests would be of great benefit for program students in exposing them to real-world applications of what they are learning. Performing ASTM tests on materials would further reinforce for students the scientific principles that have been examined in the classroom.

2.3 Soundness of Curriculum, Including Best Practices

As an integral part of the accredited associate degree program, the curriculum for the certificate program is also based on TAC/ABET criteria. In addition, input from Advisory Committee members and collaboration of the faculty contribute to the soundness of the TCAN curriculum. Curricula from other colleges provide faculty with additional promising practices to consider. The course content and structure of other programs outside of the college serve as an important resource when considering any major changes to the TCAN program.
Formal guidance concerning program structure or curriculum content came about through advisory meetings with the University of Memphis and with professional societies including the American Congress on Surveying and Mapping (ACSM), the Tennessee Association of Professional Surveyors (TAPS), and the American Institute of Architects (AIA). Additional best practice information came from curriculum review work with Sinclair Community College and Ivy Community College, both located in Ohio.

**Improvement Needs for Focal Area 2**

Incorporate more standardized ASTM testing into courses which would be of great benefit for program students in exposing them to real-world applications of what they are learning.

**Focal Area 3: Teaching and Learning**

**3.1 Focus on Teaching and Learning**

This program primarily utilizes traditional lecture/lab offerings with classes offered days and evenings to accommodate both the traditional and non-traditional students’ schedules. Most courses approach learning through first lecturing on a topic and then reinforcing the new information with lab exercises or computations. Instructors utilize videos, professional society websites, local industry websites and actual industry projects to stimulate and enhance student learning. Recently, ENTC 1124 – Engineering Technology Techniques has become a web-assisted course. The program is based on hands-on learning, and for many courses a complete online delivery method is not feasible. However in some courses, content can be adapted easily to web-assisted exercises. The online delivery method is popular and serves to benefit students in providing them more flexibility in scheduling assignments.

**3.2 Use of Instructional Methods and Materials for Mastery**

The program faculty continually strive for improvement in instructional methods and materials. Student assessments indicate when teaching methods require modifications. These modifications are implemented and then re-evaluated to confirm effectiveness. Applied problem solving, critical thinking, and hands-on technology application are integrated throughout the courses through a variety of methods including classroom instruction, laboratory work, and outside-of-class assignments. Adjunct faculty members are provided with instructional materials and are monitored to assure consistent teaching methods are being used. Through the use of laboratory equipment, students get hands-on experience to prepare them for employment in industry. In the CAD class, the instructional methodology applies simulation and constructivism theory using AutoCAD software. This class simulates what a CAD operator would encounter in the real world workplace. Continuous improvement involves redlining the student work for errors. This process of error identification and correction continues until the student has no errors, simulating
the workplace process. This process provides immediate feedback and learning for the student. The student can achieve 100% performance if instructor signs the drawing as complete. The instructor encourages the student to interact with other students when he has questions. Also the instructor asks any student who completes drawings early to help other students. These interactions are valuable in promoting teamwork. This learning process allows students to become independent and autonomous and eventually solve CAD drawing problems themselves without instructor aid. The peer instruction and teamwork concept continues in the Architectural Drawing class. Students who completes drawings early assist other students, therefore reinforcing learning with externalization of their own learning. To further enhance communication skills, 2007 Microsoft PowerPoint, Word and Excel are utilized by students. In the CAD class, students present a PowerPoint presentation and written report on the use of an AutoCAD command, explaining in detail the various options and examples of their use. The Excel spreadsheet provides a table of the various variables that come about in using dimension scale, font size, drawing setup sizes. The application of the various Microsoft Office and Autodesk AutoCAD software provides student a broad range of verbal and graphic skills.

3.3 Collaboration in Design and Delivery of Teaching-Learning Process

Program faculty and faculty within the Engineering Technologies department collaborate in the design and delivery of the teaching and learning processes of the program. Some teaching practices are shared with other departments at Southwest through professional development received during the Summer Institute. The Summer Institute is a forum for faculty from different areas of the college to present on teaching methods and new classroom technologies. Other outside influences on the program’s teaching practices have been Sinclair Community College and Ivy Community College, both in Ohio.

An improvement need that has been identified for this section is for the hiring of an additional full-time faculty member when funding becomes available. With the retirement in the spring of one of the full-time faculty, the program has been reduced to one full-time and five part-time faculty members.

Improvement Needs for Focal Area 3

Employ a Full-time tenure Track Faculty Member when funding becomes available.

Focal Area 4: Student Learning Assessment

4.1 Key Quality Indicators for Learning Objectives

Key quality indicators for the assessment of learning objectives are in place for the program. These indicators include traditional testing, lab exercises and research paper assignments. The program faculty collaboratively develop and implement assessment of learning objectives on an
annual basis. The main emphasis of student learning assessment is placed at the course level to reflect the current level of student learning and the effectiveness of the certificate program.

The TCAN program has incorporated the use of a 4 column model for listing: (1) program objectives, (2) assessment methods tied to the individual objectives, (3) assessment results, and (4) use of the assessment results in closing the loop. Documentation of the continuous improvement process for the program has been both improved and simplified through the use of the 4 column model. In the fall semester of 2008, all programs at Southwest TN Community College began using this model and posting it in the college’s online Planning System. This documentation effort helps to validate that program assessments are aligned with the learning objectives and that assessment results are used for enhancing student learning. A copy of the program’s completed 4 column assessment model for 2008-09 is presented in Appendix 6.

One improvement need that has been identified for the program during the course of the self-study is the development of standardized final exams for courses in the TCAN program.

4.2 Best Practices for Assessing Student Learning

The Architectural Engineering Technology program uses traditional arts based and engineering based assessments. Student assessment is documented through ABET outcomes. This Technology Accreditation Commission validates the skills a student must be able to demonstrate and further describes methods of assessment which are based on best practices in the architectural field.

4.3 Continuous Assessment-Based Program Improvements

As discussed in Section 4.1, student achievement of the learning outcomes is assessed and documented using the college’s online Planning System and four column model. The fourth column lists “use of results” of assessments in making continuous improvements in the program. Assessment methods are periodically reviewed and changed as needed. Improvements are made at the course level when assessment results indicate the need for change. As courses within the program are improved, the overall program is improved. Assessment-based program improvements that took place in the last cycle are recorded in Column 4 of the 2008-09 Student Learning Outcome Assessment Chart found in Appendix 6. An example of use of assessment results is indicated for Student Outcome 7 where student performance indicated that students did not demonstrate an adequate level of proficiency in the use of computer graphics associated with architectural projects. In response to this need, students were given a refresher lesson on accessing/using commands to improve their speed in completing drawing assignments. Further, a decision was made to screen students for basic computer skills, to require students to download free AudoCAD software for home use, and to coordinate the timing of Civil drawing exercises in CAD and surveying courses.
An improvement need identified for this section is for a direct assessment test or survey for the TCAN program graduates. The development of an exit exam or end of program review/survey would provide valuable information that could be used in making continuous-based program improvements.

4.4 Multiple Measures in Assessing Learning and Program Effectiveness
Multiple measures for assessing learning and program effectiveness are used as stated above. The most common methods of evaluating student’s proficiencies include portfolios, laboratory assignments, project based assignments, observing task performance, oral presentations, written reports, and exams. Program effectiveness is measured primarily through course assessment results, student evaluation of teaching surveys (SET), graduation/retention rates, compliance with ABET standards in courses shared with the ARCH program, and graduating student job placement rates.

Improvement Needs for Focal Area 4

Develop exit exam or survey for TCAN

Focal Area 5: Systematic Quality Assurance

5.1 Commitment to Continuous Quality Improvements

The TCAN program at Southwest is committed to continuous improvement. To keep up with technology and provide the students with the tools they need for industry, the program has made continuous improvement a top priority. The Engineering Technologies department is devoted to providing a quality education to its students. All members of the department collaborate to maintain high standards. These standards are apparent through the work completed to maintain ABET accreditation for all the programs in the department.

Feedback is given to the faculty related to how they are performing work related to the curriculum and other practices affecting students through the annual department chair’s evaluation and subsequent conference with chair. Faculty members receive additional valuable feedback through the results of the student evaluation of teaching surveys (SET) performed each fall semester. Quality assurance practices are periodically reviewed and improved as needed. In the 2008-09 year, both the Student Evaluation of Teaching instrument and Department Chair’s Evaluation for faculty instrument were developed or revised through formal processes which included regular input from faculty committees and ultimate approval by the Faculty Senate, Department Chairs, Deans, and the Provost. The administration at Southwest is committed to providing opportunities for professional growth and development for faculty members. Numerous opportunities throughout each academic year related to enhancing teaching
effectiveness are offered free of charge to faculty members through the Center for Faculty Development.

5.2 Systematic Quality Assurance

Efforts are being made to ensure that quality assurance will be a systematic and regular process on both the institutional and program level as discussed below.

Institutional Efforts:
The IE planning cycle is a formal internal process at Southwest used for systematic quality assurance. This process requires that all departments establish annual objectives, conduct assessments, and use assessment results to improve programs. Training in writing program outcomes for student learning was undertaken as a college-wide effort in the fall semester of 2008 with documentation of the student learning outcomes on the college’s online planning system continuing as an ongoing process at Southwest. Other forms of quality assurance regarding teaching effectiveness include the student evaluation of teaching (SET) for each faculty member and the follow-up department chair’s evaluation of faculty each spring semester. The institution is committed to providing quality services to meet the distinct needs of its diverse student population. The Academic Support Center (ASC) provides free tutoring services and resources for students to provide support that may enable them to successfully reach their educational goals. Through the services of the Advising and Counseling Centers at Southwest, professional advisors along with assigned departmental advisors provide students with a high caliber of advising deemed essential for their academic success. As part of the commitment to systematic quality assurance, Southwest has purchased a program called “AdvisorTrac” to be used for tracking advisees and maintaining records of content in advising sessions. The Advising and Counseling Centers provide valuable assistance with articulation issues for students who plan to transfer to other colleges and universities. Many of the Southwest students are first generation college students and find the support of the Advising and Counseling Centers invaluable. The Career Services Department at Southwest serves all students who request assistance with job-search strategies, resume writing, interviewing techniques, and career counseling. Five libraries are available for student, faculty and staff use and an InfoNet Library provides additional valuable online services in assuring that all students have access to library services.

Southwest Tennessee Community College is accredited by the Southern Association of Colleges and Schools – Commission on Colleges. As part of the reaffirmation of accreditation process, Southwest has responsibility for documenting compliance with 72 standards of quality and effectiveness and the Commission has responsibility for reviewing the College in accordance with those standards. In meeting the high standards required for accreditation, Southwest assures that quality education practices are in place.
**Program Efforts:**
The program has a plan in place to ensure that quality assurance is a systematic and regular process. First, the student learning objectives have been defined and conveyed to the instructors and students through the course syllabi. Secondly, a plan to measure and assess the student learning objectives is in place in which each program objective is assessed on an annual basis at the end of the spring semester. Finally, the results of the assessment are reported to the program faculty, adjunct faculty and advisory committee with the results used to make improvements to the program. After changes have been made, the program objectives will be re-assessed to determine the success of the improvements. This process will be repeated each academic year not only for the TCAN program, but also for the Architectural Engineering Technology associate degree program which is accredited by ABET. The college’s online planning system will be utilized to document the process.

With regards to academic advisement, each student is assigned an advisor but is not required to meet with the advisor. TCAN students are individually advised by a program faculty member, and the student’s academic progress is tracked each semester. A file is kept for each student with an audit form which is used for planning.

**IV. POTENTIAL RECOMMENDATIONS AND ASSOCIATED INITIATIVES**

Having assessed the overall educational quality of the Architectural Engineering Technology program in the self-study, the purpose of this section will be to present some specific initiatives for improvement. The program’s faculty members are committed to working intensively on the following quality improvement initiatives:

1. Evaluate the updated ABET Criteria for Accrediting Engineering Technology Program and incorporate them into each course.

   The ABET Criteria for Accrediting Engineering Technology Program directly affects the development of learning objectives. ABET demands evidence based objectives to meet emerging trends in the profession and industry. These trends require evolving curriculum design and improvement in course content using the best practices approach. This supports Focal Area 1 *Learning Objectives*, Focal Area 2 *Curriculum and Co-curriculum*, Focal Area 3 *Teaching and Learning*, and Focal Area 4 *Student Learning Assessment*.

2. Incorporate more standardized ASTM testing into courses.

   The ABET visiting evaluation team cited the ARCH program for performing an inadequate number of standardized (American Society for Testing and Materials) ASTM tests in the associate degree program. These tests makes services and products safer, better and more cost-effective. Students would gain practical real world experience and practice when performing
these tests and would develop employable skills. This supports Focal Area 2 *Curriculum and Co-curriculum*.

(3) Employ a Full-time tenure Track Faculty Member when funding becomes available. The College budget limits the funding for this position due to the current state economic crisis. The hiring of full time tenure track faculty member with at least a Master of Civil Engineering and possibly also a Professional Engineer license would provide an instant boost in quality expertise and professional experience. This new faculty member would provide additional quality and expertise in the ARCH program and the TCAN certificate. This supports Focal Area 3 of *Teaching and Learning*.

(4) Develop exit exam or end of program review/survey for TCAN. The TCAN certificate needs a direct assessment rather than indirect means of assessment. This assessment would provide information for improvement of the TCAN program and also the ARCH curriculum earlier than the final Major Exam or the ARCH Senior Exit Interview/Survey. This supports Focal Area 4 of *Student Learning Assessment*. 
V. MATRIX OF IMPROVEMENT INITIATIVES

<table>
<thead>
<tr>
<th>Recommended Improvement Action</th>
<th>Leadership</th>
<th>Timeline</th>
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<tbody>
<tr>
<td><strong>Project Name:</strong> (1) Evaluate the updated ABET Criteria for Accrediting Engineering Technology Program and incorporate them into each course</td>
<td><strong>Coordination:</strong> Department Head</td>
<td><strong>Beginning:</strong> Spring 2010</td>
</tr>
<tr>
<td><strong>Description of Initiative:</strong> Review the latest ABET criteria for accreditation and evaluate course outcomes to meet criteria.</td>
<td><strong>Participants:</strong> Program co-coordinator, adjunct, students, and advisory committee.</td>
<td><strong>Ending:</strong> July-August 2010</td>
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<td><strong>Intended Result:</strong> Continuous improvement for the College Institutional Effectiveness and meeting of ABET accreditation requirements</td>
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<p>| <strong>Project Name:</strong> (2) Incorporate more standardized ASTM testing into courses. | <strong>Coordination:</strong> Department head | <strong>Beginning:</strong> Spring 2010 |
| <strong>Description of Initiative:</strong> Find ASTM tests to incorporate into curriculum courses. | <strong>Participants:</strong> Program coordinator, adjuncts, advisory committee, and students | <strong>Ending:</strong> July-August 2010 |
| <strong>Intended Result:</strong> Students would gain practical real world experience and practice when performing these tests and would develop skills needed for employment in the field. |</p>
<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description of Initiative</th>
<th>Intended Result</th>
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<tbody>
<tr>
<td>(3)</td>
<td>Employ a Full-time tenure Track Faculty Member when funding becomes available.</td>
<td>Search for qualified Full-time tenure Track Faculty Member to improve the quality of the program.</td>
</tr>
<tr>
<td>(4)</td>
<td>Develop exit exam or end of program review/survey for TCAN.</td>
<td>The TCAN certificate lacks a direct assessment test or survey. Developing an exit exam or end of program review/survey for TCAN would provide the needed assessment.</td>
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<tr>
<th>Coordination:</th>
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<th>Timeline</th>
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<tr>
<td>Department head</td>
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<td>Beginning: Spring 2010&lt;br&gt;Ending: July-August 2010</td>
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<td>Appendix 1</td>
<td>Program Description/Requirements</td>
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<td>Appendix 2</td>
<td>Course Description</td>
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<td>Appendix 3</td>
<td>Enrollment Data</td>
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<td>Appendix 4</td>
<td>Faculty Credentials &amp; Advisory Board Members</td>
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<td>Appendix 5</td>
<td>Advisory Board Meetings Minutes</td>
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<td>Appendix 6</td>
<td>Student Learning Outcomes</td>
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Appendix 1 – Program Description/Requirements

ARCHITECTURAL/CONSTRUCTION FUNDAMENTALS
Technical Certificate

The Architectural/Construction Fundamentals Certificate Program emphasizes the basic skills needed to begin a career in architecture and building construction. Designed for high school graduates or those entering the design and construction field for the first time, the program covers six important areas. These areas include engineering technology techniques, architectural drawings, surveying, computer aided drawing, the materials and methods of building construction, and the use of modern computer software including word processing, spreadsheets, and databases.

Candidates cannot already hold a degree in the Architectural Design and Civil/Construction concentrations of Architectural Engineering Technology. Candidates must also meet the requirements of a First-time College Student or Transfer Student (see Admissions section of the Southwest catalog). Candidates must take at least 16 of the 19 hours at Southwest. Each student should assure that he or she has met the prerequisites before attempting to register for a course.

Students who complete this certificate program will be qualified to enter the Cooperative Education (Co-op) Program and/or entry-level positions in the design and civil/construction fields. The purpose of the Co-op Program is to train students in these fields, combining classroom with actual work experience. Many employers participating in Co-op provide tuition for those who wish to continue their education. Certificate holders can work as technicians with architects, engineers, building component manufacturers, real estate developers, facility managers, commercial and service industries, residential and commercial contractors, and government agencies. All courses except ENTC 1124 will transfer to the Architectural Engineering Technology program in the Design or Civil/Construction concentrations.

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<tr>
<th>Course Number</th>
<th>Course Title</th>
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<tr>
<td>ENTC 1124</td>
<td>Engineering Technology Techniques</td>
<td>3</td>
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<tr>
<td>INET 1004</td>
<td>Technical Computer Applications for Technicians¹</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 1124</td>
<td>Architectural Drawing</td>
<td>3</td>
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<td>ARCH 1244</td>
<td>Materials and Methods</td>
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<td>ARCH 2644</td>
<td>Computer Aided Drawing</td>
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<tr>
<td>CCET 1010</td>
<td>Surveying I</td>
<td>4</td>
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<tr>
<td><strong>Total Credit Hours</strong></td>
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<td><strong>19</strong></td>
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¹CPET 1114, Computer Systems Installation and Maintenance with Applications, may be substituted.
## Appendix 2 – Course Descriptions

### ARCH 1124 – Architectural Drawing

This course is an introduction to the fundamentals of graphic representation of subjects that are architectural in nature. Drafting expressions and light construction principles are stressed to increase the student's knowledge and proficiency in drawing architectural plans and details. Corequisite: ENTC 1124 or permission of program coordinator.

### ARCH 1244 - Materials And Methods

This course familiarizes the student with physical properties, grades, and uses of materials generally employed in residential and commercial construction. Prerequisites: ARCH 1124 or ARCH 2644 or permission of program coordinator.

### ARCH 2644 - Computer Aided Drawing

This is an introduction to basic computer concepts and software applications for creating computer-aided drawings for architectural activities. The emphasis will be in AutoCAD software. Corequisite: ENTC 1124 or permission of program coordinator.

### CCET 1010 - Surveying I & Lab

This course covers the fundamentals of plane surveying, with practice in the use of the tape, level, and theodolite in making horizontal and vertical measurements. Fieldwork includes boundary surveying, topographic, profile and benchmark leveling, with procedures of keeping field notes and note reduction. Construction layout is covered. Instructions are given in survey calculations including traverse closure calculating by the Coordinate method. This course also introduces the student to Wild TC 1000 Electronic Total Station surveying equipment. Corequisite: EWN TC 1124 or permission of program coordinator.

### ENTC 1124 - Engineering Tech Techniques

This course introduces the student to engineering technology and the techniques and methods of technical problem solving. It covers such topics as the field of engineering technology, career orientation, technical math, hand-held calculator usage, applied algebra, trigonometry applications, measurement systems, unit conversions, reading scales, measuring devices, geometry applications, constructing graphs, systematic problem solving and library usage. Prerequisite: Permission of program coordinator.

### INET 1004 - Tech Computer Applications

This course is a practical experience in using Windows-based personal computers for special business and industrial applications. An integrated software system (Microsoft Office) applying a word processor, a spreadsheet, and a database used separately and integrated is used. BASIC programming and Windows are also covered. Prerequisite: ENTC 1124 or permission of program coordinator.
 Appendix 3 – Enrollment Data

Architectural/Construction Fundamentals Certificate Profile

Note: (1) Enrollment data is based on declared major as of 14\textsuperscript{th} day of class. (2) Students awarded certificates in this program may include students who met graduation requirements for this program but had not declared the program as their major.

Fall 2009 Enrollment Profile

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<th>Hispanic</th>
<th>White</th>
<th>Other Race</th>
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Certificates Awarded

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<tr>
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<td>4</td>
<td>6</td>
<td>7</td>
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<td>6</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td></td>
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</tr>
</tbody>
</table>

Source: 14\textsuperscript{th} day Census files and graduation files
Appendix 4 - Faculty Credentials & Advisory Board Members

**Full Time Faculty**

Robert Tom
- BArch degree, *Architecture*, Tulane University
- MArch degree, *Architecture*, Tulane University
- MArch degree, *Architecture*, University of Pennsylvania
- MCP degree, *City Planning*, University of Pennsylvania

**Part Time Faculty**

Hans Faulhaber
- BArch degree, *Architecture*, University of Tennessee

Carl Heinrich
- BS degree, *Construction Engineering Technology*, Memphis State University

William Simon
- BS degree, *Technical Education*, Mississippi Valley State University
- MS degree, *Operations Management*, University of Arkansas
- AAS degree, *Civil Engineering Technology*, State Technical Institute at Memphis

Christopher Davis
- MArch degree, *Architecture*, Virginia Tech
- BSET degree, *Architectural Engineering Technology*, University of Memphis

Charles Miller
- BSET degree, *Architectural Engineering Technology*, Tennessee State University

**Advisory Board Members**

Clark Buchner, *Atkins Buchner Price Architects*, Principal
Patricia Endicott, *Tetra Tech Inc.*, CAD Designer 5
Howard Glatstein, *Fisher Arnold, Inc.*, Principal
Reb Haizlip, *Haizlip Studio*, Principal
Carl Heinrich, Southwest Adjunct Professor
Ken King, King Engineering, Principal
Charles Miller, Self Tucker, Project Architect
Arthur Nave, Auto Zone, Project Manager
John Pruett, John Pruett Architects, Principal
William Simon, Southwest Adjunct Professor
Tom Sullivan, Tom Sullivan & Associates, Owner
Jamnu Tahiliani, retired Structural Engineer, Owner
Robert Tom, Southwest program coordinator
Appendix 5 - Advisory Board Meeting Minutes

Industrial Advisory Committee Meeting Minutes

January 5, 2009

Members in attendance:

Patricia Endicott
Howard Glatstein
Carl Heinrich
Ken King
Charles Miller
John Pruett
Robert Tom
William Simon

The General Engineering Technology meeting opened at 12:00 noon with introduction by Department Head Garry Spencer and Dean Mike Stephens. A short presentation was made by Brenda Williams, Associate Director Career Services. She requested the industry members to complete a 2009 Employer survey which was furnished at the meeting and passed out copies of the 2008 survey data for their information. A short presentation was made on Carl Perkins Funding and information on a newsletter to be started at Southwest by Shayla Guy, Counselor. Employer’s present were encouraged to have their names added to the mailing list.

Lunch was provided to the members.

The various Engineering Technology programs broke out into individual sessions. The Architectural Engineering Technology session was held in Farris “A”. The meeting was called to order at 12:47 PM.

William “Bill” Simon handed out copies of the Program Outcomes and program’s curriculums. Members were asked to introduce themselves. Bill discussed some history about the Architectural Engineering Technology programs and the programs consisting of one 9-month faculty member and one 12-month faculty member. Needs for Adjunct members were requested.

Bill provided an update on the TAC/ABET visit and reviewed the two weaknesses of the program listed by the visiting evaluation team. Weakness 1: Demonstrate that graduates have an understanding of professional, ethical and societal responsibilities, respect for diversity and knowledge of contemporary professional, societal and global issues. Bill stated the program would respond to this weakness by indicating the Architectural students are required to take INET 1004, which these topics are covered and make some additions to existing courses to address this weakness. Weakness 2: Continuous Improvement. Process was discussed with the need for additional input from the advisory members. Bill made a recommendation that the advisory committee communicate by e-mail between regular meetings to improve communication and obtain member input.
Bill continued the update on the TAC/ABET visit with two concerns of the program listed by the visiting evaluation team. Concern 1: “not doing enough material field testing” was discussed at length. Bill reviewed the in place density test presently being done in the materials class. The addition of Compression testing of Concrete cylinders and slump testing were recommended. John Pruitt stated X-Raying welds was a test he often encountered on his jobs and the in place compressive testing of concrete. Concern 2: Program Advisement. Bill made a recommendation that the advisory committee communicate by email between regular meetings to improve communication and obtain member input.

Charles Miller stated students should know how to research standards and evaluate and compare submittals of test results on a job, but didn’t necessarily need to know the specifics of the testing process. Howard agreed with him and continued the discussion on this topic with general agreement that students should know the concepts of the various field tests and be able to discuss them with the contractor and engineers. The key is to teach terminology to the students. Charles made a suggestion we incorporate instruction on how to research information in technical libraries to find specific information on the specific field test of interest. John suggested we do a slip test for the various materials used on floors, and believed the testing instrument would be reasonably priced. He has encountered this on many of the projects he had done.

Charles suggested we get the device to test for slope for ADA compliance.

Bill talked about the PO’s e-mailed out to the members.

Robert took over this topic and went over outcomes and discussed closing the Loop. Discussion was held on how Program outcomes PO’s and Course Outcomes CO’s are related. Robert explained about the quality of the incoming students to the program and how lacking they are in basic skills. Robert required the whole process and tried to explain the ABET process and what is needed from Advisory members.

Howard stated anything we can teach the student to require less time for on the job training is what employers need. His office calculates 12K to 15K is needed to train a new employee to be productive on the job.

There was a discussion of REVIT vs. Desk top. The members didn’t like REVIT and none were using it. Howard stated that a few of the projects he was bidding on did require it.

Bill presented an update on the enrollment stating presently 115 students are enrolled in the program with most coming from the certificate program, which Bill briefly described. Bill reported 13 students are scheduled to graduate in the spring of 09 from the AS program.

Bill asked the members for a report on the status of industry. Howard and Pat reported they were just holding on without new hires and limited layoffs. The general consensus was anyone doing development had a significant reduction in work and wouldn’t be doing any hiring in the near future. Howard reported the State of Tennessee has a large sum of money for design and
Appendix 5 - Advisory Board Meeting Minutes, continued

construction projects for civil firms that will be available in the near future. Shelby county schools have several new schools that will be designed and built in the next few years.

There was a discussion as to employment of 2 yr vs. 4 yr graduates. It was stated that there are limited jobs as a designer for graduates of 2, 4 and 5 year programs. There are numerous jobs available in the industry for graduates of 2 yr programs such as specification writer, estimator, computer drafting etc.

There was a general discussion of transfer from Southwest to a 4 year program noting U of M will not accept our credit, but there are several colleges in Tennessee and surrounding states that do accept it.

Bill discussed an E-mail process to communicate with the members for input to meet requirements of the certificate program self study. Robert gave some examples of the type of input needed from the members.

The meeting was adjourned at 2:03 PM.
## Appendix 6 – Student Learning Outcomes

<table>
<thead>
<tr>
<th>Obj</th>
<th>Student Outcome</th>
<th>Means of Assessment</th>
<th>Assessment Results</th>
<th>Use of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Applies to ARCH and TCAN. Communicate effectively through proper use of oral, written, and graphic skills.</td>
<td>Measurement is demonstrated in lab exercises and exit exams in the following courses: ARCH 1224, ARCH 1244, ARCH 2644, ARCH 2714, ARCH 2744, ARCH 2824, CCET 1010, and INET 1004. Intended Level of Performance: Minimum 80% Additional methods and sources: 1. Faculty Perception Survey. 2. Advisory Board. 3. Questionnaire to Graduates. 4. Questionnaire to Employers of Graduates. 5. Placement data. 6. Portfolio. 7. Senior Exit Interview/Survey.</td>
<td>SOURCE: Assessment Form from CCET 1010 Traverse Survey Report. Measurements of performance were less than desired level. (70%)</td>
<td>Sample reports were distributed to assist students’ performance. Urge students to improve their written communication and start on reports early.</td>
</tr>
<tr>
<td>2</td>
<td>Applies to ARCH and TCAN. Use surveying equipment and software applications to collect data, solve technical problems, and layout construction projects.</td>
<td>Measurement is demonstrated in lab exercises and exit exam in CCET 1010. Intended Level of Performance: Minimum 80% Additional methods and sources: 1. Faculty Perception Survey. 2. Advisory Board. 3. Questionnaire to Graduates. 4. Questionnaire to Employers of Graduates. 5. Placement data. 6. Portfolio. 7. Senior Exit Interview/Survey.</td>
<td>SOURCE: Assessment Form. Measurements of performance were greater than desired level (92%)</td>
<td>No corrective actions required.</td>
</tr>
<tr>
<td>3</td>
<td>Applies to ARCH and TCAN. Function effectively in teams—demonstrating a cooperative effort to implement plans of action to problem solving.</td>
<td>Measurement is demonstrated in goal related questions on the exit exam and in specific lab exercises in the following courses: ARCH 2644 and CCET 1010. Intended Level of Performance: Minimum 80% Additional methods and sources: 1. Faculty Perception Survey. 2. Advisory Board. 3. Questionnaire to Graduates. 4. Questionnaire to Employers of Graduates. 5. Placement data. 6. Portfolio. 7. Senior Exit Interview/Survey.</td>
<td>SOURCE: Faculty Perception Survey. Measurements of performance were greater than desired level. Source: Faculty Perception Survey. Introduce more team activities (95%)</td>
<td>No corrective actions required. In ARCH 2644, Encourage students to help each other in completing class exercises to build team cooperation.</td>
</tr>
<tr>
<td>4</td>
<td>Applies to ARCH and TCAN. Employ logical and concise problem solving techniques to complex problems.</td>
<td>Measurement is demonstrated in goal related questions on the exit exam and in specific lab exercises in the following courses: ARCH 2714, CCET 1010, CCET 2203, and MEET 1154. Intended Level of Performance: Minimum 80% Additional methods and sources: 1. Faculty Perception Survey. 2. Advisory Board. 3. Questionnaire to Graduates. 4. Questionnaire to Employers of Graduates. 5. Placement data. 6. Portfolio. 7. Senior Exit Interview/Survey.</td>
<td>SOURCE: Assessment Form. Measurements of performance were greater than desired level (82%)</td>
<td>No corrective actions required, but beginning next cycle more example problems will be given to address students that are scoring below the intended level.</td>
</tr>
<tr>
<td>Obj</td>
<td>Student Outcome</td>
<td>Means of Assessment</td>
<td>Assessment Results</td>
<td>Use of Results</td>
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<tr>
<td>5</td>
<td>Applies to ARCH and TCAN. Demonstrate a thorough knowledge of common construction materials-both their proper usage and testing procedures.</td>
<td>Measurement is demonstrated in goal related questions on the exit exam and in specific lab exercises in the following courses: ARCH 1224 and ARCH 1244.</td>
<td>SOURCE: Assessment Form. Measurements of performance were greater than desired level. Source: Faculty Perception Survey. Students have little understanding of “green” sustainable materials. Source: Advisory Board. The industrial advisor states that students should know how to research standards and evaluate and compare submittals of test results on a job, but did not have to know the specifics of the testing process.</td>
<td>No corrective actions required. Show movies of Green building design and require oral and written reports on “green” materials. Introduce how to research standards and evaluate and compare submittals of test results on a job in ARCH 1224 and ARCH1244.</td>
</tr>
<tr>
<td>6</td>
<td>Applies to ARCH and TCAN. Demonstrate the capability to develop architectural drawings including working drawings, presentation drawings and shop drawings.</td>
<td>Measurement is demonstrated in goal related questions on the exit exam and in specific lab exercises in the following courses: ARCH 1124, ARCH 1224, ARCH 2644, ARCH 2714, and ARCH 2744.</td>
<td>SOURCE: Assessment Form. Measurements of performance were greater than desired level. Source: Faculty Perception Survey. Shop drawings not used.</td>
<td>No corrective actions required. Shop drawing required to build matchstick bridge in ARCH 1244 Material and Methods</td>
</tr>
<tr>
<td>7</td>
<td>Applies to ARCH and TCAN. Be proficient in the use of computer graphics associated with architectural projects.</td>
<td>Measurement is demonstrated in goal related questions on the exit exam and in specific lab exercises in the following courses: ARCH 2644 and ARCH 2844.</td>
<td>SOURCE: Assessment Form. Measurements of performance were less than desired level. Source: Faculty Perception Survey. Some students have inadequate computer skills. No AutoCAD software for home use. Surveying Course exercises and Computer Aided drawing exercises with civil drawings need to be coordinated.</td>
<td>The students were given a refresher lesson on how to access/use commands to improve their speed in completing drawing assignments. Screen students for basic computer skills. Require students to download free AutoCAD software for home use Faculty coordinate timing of Civil drawing exercises in CAD and Surveying courses.</td>
</tr>
<tr>
<td>8</td>
<td>Applies to ARCH and TCAN. Use, understand and apply building codes to architectural projects.</td>
<td>Measurement is demonstrated in goal related questions on the exit exam and in specific lab exercises in the following courses: ARCH 1124, ARCH 1224, ARCH 2644, ARCH 2714, ARCH 2744, and CCET 2203.</td>
<td>SOURCE: Assessment Form. Measurements of performance were greater than desired level. Source: Faculty Perception Survey. No book for building code required</td>
<td>No corrective actions required. Require the purchase of International Building Code 2003for program courses.</td>
</tr>
<tr>
<td>Obj</td>
<td>Student Outcome</td>
<td>Means of Assessment</td>
<td>Assessment Results</td>
<td>Use of Results</td>
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<tr>
<td>9</td>
<td>Applies to ARCH and TCAN. Understand the basic theories of design, installation, and operation principles of mechanical components of buildings and relationship among them.</td>
<td>Measurement is demonstrated in goal related questions on the exit exam and in specific lab exercises in the following courses: ARCH 1124, ARCH 1244, ARCH 2714, ARCH 2744, and CCET 2203. Intended Level of Performance: Minimum 80%. Additional methods and sources: 1. Faculty Perception Survey. 2. Advisory Board. 3. Questionnaire to Graduates. 4. Questionnaire to Employers of Graduates. 5. Placement data. 6. Portfolio. 7. Senior Exit Interview/Survey.</td>
<td>SOURCE: Assessment Form. Measurements of performance were less than desired level. Source: Faculty Perception Survey. No HVAC calculation software used. (63%)</td>
<td>Students were given additional step-by-step instruction on designing components and required to give immediate feedback in class assignments. Research in using HVAC calculation software in class work.</td>
</tr>
<tr>
<td>10</td>
<td>Applies to ARCH and TCAN. Use, understand and apply basic principles and current practices employed in estimating construction costs.</td>
<td>Measurement is demonstrated in goal related questions on the exit exam and in specific lab exercises in the following courses: ARCH 1124, ARCH 1244, and ARCH 2824. Intended Level of Performance: Minimum 80%. Additional methods and sources: 1. Faculty Perception Survey. 2. Advisory Board. 3. Questionnaire to Graduates. 4. Questionnaire to Employers of Graduates. 5. Placement data. 6. Portfolio. 7. Senior Exit Interview/Survey.</td>
<td>SOURCE: Assessment Form. Measurements of performance were greater than desired level. SOURCE: Faculty Perception Survey. Timberline software outdated. Building Information Modeling (BIM) used with Revit software and estimating software provides current state of art technology. (85%)</td>
<td>No corrective actions required. In process of evaluating new estimating software-MC2Evaluating Innovaya Software to extract Area quantities from Revit three dimensional models.</td>
</tr>
<tr>
<td>11</td>
<td>Applies to ARCH and TCAN. Understand and apply theories and concepts of architectural theory and design as a problem solving process.</td>
<td>Measurement is demonstrated in goal related questions on the exit exam and in specific lab exercises in the following courses: ARCH 1124, ARCH 1224, ARCH 1244, and ARCH 2744. Intended Level of Performance: Minimum 80%. Additional methods and sources: 1. Faculty Perception Survey. 2. Advisory Board. 3. Questionnaire to Graduates. 4. Questionnaire to Employers of Graduates. 5. Placement data. 6. Portfolio. 7. Senior Exit Interview/Survey. 8. FCAR</td>
<td>SOURCE: Assessment Form. Measurements of performance were greater than desired level. SOURCE: Faculty Perception Survey. Student interest and participation waning Lack of analytical techniques to apply theories and concepts in problem solving process (95%)</td>
<td>No corrective actions required. Introduce design projects that require more building and construction: Cardboard Chair Design project introduced. Introduce analytical graphic diagrams in identifying problems in site planning and in investigating Architectural design concepts</td>
</tr>
</tbody>
</table>