



# Texas Higher Education Coordinating Board

## Texas Higher Education Coordinating Board and Lumina Foundation for Education

### Minutes Tuning Oversight Council for Engineering and Science February 25, 2011 10:00 a.m. to 3:00 p.m.

Wyndham Garden Hotel and Conference Center  
Executive Learning Center  
Austin, Texas

**Members Attending:** Lava Banjara (student), Lennine Bashiri, Maria Benavides, Leonidas Bleris, Richard Bowers, Stacie Brown, Jerrod Butcher, Ting Chen (for Metin Akay), John Chisholm, Charles Chuong, Charlene Cole, John Criscione, Linda Crow, Sanaa Drif (student), Harvinder Gill, Michael Gyamerah, James Holste, Catherine Howard, Lee Hughes, Arif Karim, Genaro Lopez, Andrew Mark (student), David Marshall, J. Kelly McCoy, Prakesh Nair, James Nelson, Michael Nikolau, Scott Nunez, Joo Ong, Patrice Parsons, Lynda Peebles, Steve Rathbone, Marisela Rodriguez, Steven Salvato, Chandeshwar Sharma, James Tunnell, Mark Vaughn, Chris Wild, Darren Williams, James Zech

#### **Members Attending Virtually:**

Peyton Richmond, Joe Studer, Amy Vickers

**Facilitators and other Attendees:** Charlotte Biggerstaff, Reinold Cornelius, Duane Hiller, Michelle Kalina, Kevin Lemoine, David Marshall, Suzanne Pickens, Debbie Rodriguez, Sarah Rondinelli, Mary Smith, Melinda Valdez-Ellis

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Registration was held and a Continental Breakfast served between 9:30 and 10:00 a.m.

The meeting convened at 10:00 a.m.

#### **Welcome and Introductions; Charges to Tuning Oversight Council and Discipline-Specific Committees**

Dr. Mary Smith welcomed members to the meeting. She thanked everyone for their willingness to serve on the Council. She provided a brief summary of the history of the grant from Lumina Foundation for Education (Lumina) and its purpose. She explained the importance of the Voluntary Mechanical Engineering Compact and its effect on transfer of courses for students. The Lumina Tuning initiative is a faculty-led initiative designed to determine what students need to know, understand, and be able to demonstrate after earning a degree in a particular field. Tuning will assist students by lowering out-of-pocket costs and by removing barriers to transfer and successful degree completion. Tuning has the same goals as the Texas Higher Education plan, *Closing the Gaps by 2015*. This group is a Council and

contains four committees. Materials and presentations are organized on flash drives and are online at <http://www.thecb.state.tx.us/TuningTexas/TOCES>. Dr. Smith pointed out what materials are available on flash drives, and went over information in packets.

Twelve academic disciplines will be tuned over the four year grant period. In addition to the currently-working Tuning committees on Civil, Electrical, Industrial, and Mechanical Engineering, this year's disciplines will include Biomedical and Chemical Engineering as well as Biology and Chemistry.

Dr. Smith went over the formal charges to the committees. Charges include: identifying clear learning outcomes in their disciplines; assisting the THECB in sending links to surveys; mapping employability of graduates from specific disciplines; drafting degree profiles; identifying courses needed in order to migrate from two- to four-year programs; and, providing an assessment of the process and making recommendations for future work.

Dr. Smith introduced staff members from the Institute for Evidence-Based Change, who are working with Lumina to evaluate the tuning process in Texas. She then introduced Coordinating Board liaisons and staff and described their functions on the project. She next asked that Council members introduce themselves, the institutions in which they serve and their roles, and how they became interested in their disciplines.

### **Election of Chair and Co-Chair**

Dr. Kevin Lemoine presided over elections of the Council chair and co-chair. Dr. James Nelson was nominated as chair and was unanimously elected by the Council. Dr. Linda Crow was nominated as Co-chair and was unanimously elected by the Council.

### **Tuning and Course Alignment Process Overview; Questions and Answers**

Dr. Smith described the two types of work to be done by the Council: Tuning, which is defined as creating a shared understanding of the subject-specific knowledge and transferable skills that a student should be able to demonstrate upon completion of the degree; and Fine-Tuning, which identifies a set of common courses within the discipline and aligns the learning outcomes across institutions to provide a basis for voluntary transfer compacts and articulation agreements. She discussed the Academic Course Guide Manual (ACGM) and its purpose. Courses described in the ACGM are often very broad, and students may receive different skills taking the same course at different institutions. The proposal is to add learning outcomes to courses in the ACGM, so that students can take a class at any institution in the state and gain the same knowledge and skills. Faculty members determine, for each discipline, what students need to know and be able to do upon graduation. Finally, a mapping of employability with the degree allows students and parents to know what kind of work a student could expect to do upon completion of the degree. Outcomes of the Tuning include defining clear learning objectives for faculty teaching the courses, and facilitating student transfer from one institution to another. She mentioned the *Closing the Gaps by 2015* higher education plan from the Texas Higher Education Coordinating Board and how the Tuning process contributes to the goal of graduating more students in Texas.

The second piece, after program-level Tuning, will be determining which courses form the lower-division foundation for the degree. Feedback will be solicited from faculty throughout the state.

Dr. Smith demonstrated the flowchart on prerequisites from the Voluntary Mechanical Engineering Transfer compact as an example of how the work will be done. She then showed how the description of the course Dynamics was modified to include course objectives for the ACGM after Fine-Tuning.

Discussion followed on the ACGM and the fact that the courses listed within are those that can be taught by a community college and that are eligible for state funding. In order to receive funding from the state, courses must be taught according to the description in the ACGM. Signing the Voluntary Mechanical Engineering Compact does not mean the college is obligated to teach all those courses; however, if the courses are taught, the participating institution agrees that the course(s) will be taught according to the description and learning outcomes in the ACGM.

## **Orientation to Charges; Navigating the Tuning Process in the Context of Accreditation; Questions and Answers**

Dr. Nelson described a broad perspective of the Tuning process. He addressed a question on the vertical alignment of courses. He described the process of Tuning not as the how – the way a course is taught should be up to the professor – but the what. Students should come out of a course, wherever it is taken, equally prepared with foundational knowledge for the next level course. A study of the 2003 Texas cohort of 650,000 first-time college students showed that two-thirds of those students began at community colleges. Just under 5 percent of the population of that class either declared engineering as a major or graduated with a degree in engineering over the next six years. Of that 5 percent, three-fourths began at a four-year university and just one-fourth began at a community college. From personal experience, he related the difficulty of student transfer into engineering because of inconsistencies in courses being taken at the lower-division levels.

The first step in Tuning is stating the body of knowledge for the discipline – the knowledge, skills, and attitudes obtained through education and experience that is necessary to be able to assume responsibility for projects in the field. This is some time after graduation, usually about five years. Program outcomes list what is expected at graduation.

Looking at the educational pyramid, the knowledge begins in P-12, and those foundational skills are built upon. All pieces must fit together. Students beginning at community college must be able to take courses that move seamlessly into the university level. Program accreditation, such as Southern Association of Colleges and Schools (SACS) or Accreditation Board for Engineering and Technology (ABET), also must be considered.

In considering program outcomes, a Level of Achievement must be determined. Dr. Nelson demonstrated this concept using Bloom's taxonomy and its levels of learning. One of the outcomes to be accomplished is to build the body of knowledge profile for each discipline. Outcomes will show up across the x-axis, and committees will write a description of each outcome. This is to describe where the profession is going. Members were reminded to look at the big picture, and that other bodies, such as ABET or SACS, will not change because of this Tuning process. A key consideration will be to define the level of skill the student should present at different levels. Also under consideration will be which courses students should take for each discipline to be able to transfer to a university at approximately a junior level. The body of knowledge pieces fit here to define the discipline.

Transferability of courses is very important. Dr. Nelson requested that members spend some time before the next meeting to become familiar with the ACGM. Community colleges are bound by the ACGM, and he expressed his opinion that universities should be, too, at the lower-division level.

In Tuning a discipline, curriculum is aligned and a body of knowledge is developed. Student transfer and degree completion are facilitated. The student is the focus of this project.

Dr. Nelson summarized the charges to the Council; first is to develop an outcomes-based, discipline-specific body of knowledge with expected levels of competency. Next is to support the administration of the surveys, then to map the employability of graduates in the labor market. Finally, committees will identify lower-division coursework that will transfer to a four-year institution.

The guiding principles for members include: transparency - speak with colleagues about the work; look at accrediting bodies' requirements; and finally, build consensus. As in horizontal alignment, there will be no standardized curriculum. Each institution will have developed its own curriculum, and this is the reason students choose one institution over another.

Two important publications were recommended: *The Engineer of 2020*, and *Rising Above the Gathering Storm*. Both are included among materials on the flash drives.

Dr. Nelson emphasized that the key to success will be open participation by everyone. Nothing is secret – get input from many sources. The end effect will be that students will benefit.

### **Samples of Tuning Deliverables**

Dr. Reinold Cornelius began by recommending to all participants, including students, that they take an active role in the tuning process. He reminded the Council that they must fight the urge to talk about curriculum: tuning is not about curriculum. Tuning is putting together competencies students must gain during their education, then making a coherent picture of the discipline for non-technical stakeholders. Course alignment is the second step, but is about course outcomes and sequence, not curriculum. He emphasized that talk should be about competencies, not courses.

Different forces come from professional societies, accrediting bodies, and state requirements. There are three main deliverables for Tuning: first, the competency table for each field; second, a one page or shorter description of each learning outcome; and, the profiles for expertise and employment. Dr. Cornelius described and showed examples of each deliverable as completed by the Civil Engineering committee.

### **Breakout Session Preparations**

Dr. Smith described the activities for the breakout sessions. Boxed lunches were available to be picked up and members were directed to report to breakout rooms to have lunch, get acquainted, and discuss the questions listed on the committee agendas. Committees would also receive training on LiveMeeting and Sharepoint access to facilitate virtual meetings and sharing of work in progress.

Dr. Smith adjourned the meeting to break-out sessions at 12:30 p.m.

### **Lunch and Sessions for Discipline-Specific Committees; Election of Chairs (Universities) and Co-Chairs (Community Colleges)**

Committees met for the initial work session in the following rooms:

1. Blanco Room - Members of the Biomedical Engineering Committee  
Chair: John Criscione  
Co-Chair: Lennine Bashiri
2. Guadalupe Room - Members of the Chemical Engineering Committee  
Chair: James Holste  
Co-Chair: Steve Rathbone
3. Barton Creek Room - Members of the Biology Committee  
Chair: Lee Hughes

Co-Chair: Marisela Rodriguez

4. San Gabriel Room - Members of the Chemistry Committee  
Chair: Darren Williams  
Co-Chair: Chris Wild

Boxed lunches were served to provide time for a working lunch. Each group received brief instruction on SharePoint and LiveMeeting Software.

Activities completed during breakout sessions included the following:

- Election of Chair and Co-Chair
- Define Broad Committee Activities
- Begin Discussion of Body of Knowledge
- Finalize "Report Out" Points for Council
- Determine Date of First Virtual Meeting
- Break

The full Council reconvened at 2:20 p.m. in the Executive Learning Center.

### **Discipline-Specific Committees Report Out to Full Council**

Dr. Nelson began the afternoon session by emphasizing the importance of the changes to science and engineering education being created with this project. He requested that newly-elected chairs of each committee report on the committee discussions during breakout sessions.

Biology Chair, Dr. Lee Hughes of the University of North Texas, reported that Biology is the only group that has no accrediting body, presenting both a challenge and an opportunity. The committee will look at studies that exist to assist with their work. A number of resources will be gathered and analyzed for learning outcomes. The group set their first virtual meeting for late March. Co-chair for Biology is Marisela Rodriguez of Laredo Community College.

Biomedical Engineering Chair, Dr. John Criscione of Texas A&M University, related that the first task of the committee will be to identify constituencies (where the students go after graduation) of the discipline. The committee has set the first virtual meeting for March 11, 2011, at 11:00 a.m. Elected Co-chair is Lennine Bashiri of South Texas College.

Dr. Darren Williams of Sam Houston State University, Chair of the Chemistry Committee, reported that Chris Wild of San Jacinto College was elected Co-chair. Mr. Wild's institution is surrounded by industry, so has many contacts. The first virtual meeting was set for late March. The American Chemical Society certifies degrees more than chemists. Therefore, the committee plans to turn to industry as they determine outcomes and competencies. They have also made plans for contacting non-participating institutions to ensure input and buy-in. Finally, they discussed what implementation will look like.

Dr. James Holste of Texas A&M University, elected Chair of Chemical Engineering, reported that the first virtual meeting of the committee has been set for March 24. Steve Rathbone of Blinn College was elected Co-chair. He stated that two issues have been identified for the project; first, that the four-year institutions have extensive information on outcomes because of ABET accreditation requirements. Commonalities across the four institutions represented on the committee will be identified. Competencies that are expected from transfer students will also be identified.

Dr. Nelson discussed the implementation of the work by describing the approach to the Voluntary Mechanical Engineering Transfer Compact. The Compact describes the courses recommended for transfer

into the degree program and the institutions voluntarily sign-on and agree to teach these courses as described and to accept them in transfer. 83 percent of four-year programs and 75 percent of community colleges/systems have signed the Compact. The admission statement is being reworked to be more acceptable to those institutions that have not yet signed on. Accountability measures (such as funding on completion) are incentives for institutions to participate in such initiatives, which are designed to facilitate and encourage student degree completion to the standard required. Another incentive is the requirement that students pay out-of-state tuition when they exceed the maximum number of credit hours. Universities stand to gain additional funding by filling empty slots in their degree programs through successful transfer. There is also Reverse Articulation to assist Community Colleges to receive credit for graduates from universities to increase their completion numbers. The Coordinating Board has not mandated this, but has facilitated the movement.

### **Wrap Up, Looking Ahead, and Next Steps**

Dr. Smith called the attention of the Council to the travel guidelines and reimbursement forms. She asked that members submit expenses within about 10 days of the travel. The timeline shows target dates for full council meetings, and she asked that members look at the dates and provide input.

She reminded the group that this should be a statewide initiative, and encouraged them to speak to colleagues as widely as possible about the work.

Finally, she encouraged members to look at the information provided on flash drives about Institutional Review Boards (IRB) that are required for survey participation. She explained the process used for surveying students online, and reminded members that the Coordinating Board staff is in place to help with the work of the committees. Finally, she asked that members complete the evaluation forms and leave them at their tables.

Dr. Nelson reiterated that members should begin the Institutional Review Board process as soon as possible to facilitate the surveys. He also recommended the gathering of information from industry.

### **Adjournment**

A motion to adjourn the meeting was made and seconded at 2:55 p.m. The meeting was adjourned by Chair Nelson.