Implementation Guide
to the
P20W Education Standards Council

XML Standards Format
for the
Education Course Inventory (Catalog)

Version 1.0.0

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Introduction

For the higher education community to achieve the timely, uniform, accurate and secure exchange of the academic information about the courses offered at an educational institution, the Postsecondary Electronic Standards Council (PESC) has developed and approved a standard format in eXtensible Markup Language (XML) for the Education Course Inventory. The schema was approved by PESC and this Implementation Guide is to assist the non-technical user in the implementation of the process for the exchange of course information electronically using the approved format.

It is intended for use by postsecondary educational institutions, by software vendors, and by state and federal education agencies.

The course inventory (catalog) is used by educational institutions to transmit current and historical records of course information at the sending institutions. When a student transfers (or intends to transfer) from one college or university to another, it is essential that the receiving institution can evaluate the course credit and transferability as quickly as possible so that a possible decision can be made about the admissibility of the student to the new school. In addition, the course information assists the new institution in advising the student as to how his/her prior academic record will be used to satisfy course requirements at the new school for the student’s program objective there.

The course inventory contains current and historical course information, including course descriptions and other data that provide information for determining the level and content of the courses.

For the electronic exchange of these records to be completely automated, it is essential that all users adhere strictly to the requirements of the schema. It is also important for all users to understand and comply with requirements outlined in this Implementation Guide.

This Implementation Guide is based on the PESC XML Educational Course Inventory Schema version 1.0.0.

Organization and Format

The schema for the Educational Course Inventory is fundamentally made up of four main parts:

1. Transmission Data
2. Course Inventory Information
3. Note Message
4. User Defined Extensions

However, each of these main parts branch to other parts and then subsequently to further branching.

This Guide is organized so that each level of branching is documented in the order as follows:

Transmission Data Level I
   Sub-level IA
      Sub-level IA1
         Sub-level IA1a
         Sub-level IA1b
         Sub-level IA1c
      Sub-level IA2
         Sub-level IA2a
         Sub-level IA2b
   Sub-level IB
      Sub-level IB1
         Sub-level IB1a
Course Inventory Information Level I

In the heading for each level and sub-level, the position in the schema diagram about to be discussed is indicated.

The description of each new branching level is introduced with a diagram showing its relationship to the preceding branch. This diagram was copied from a representation of the Educational Course Inventory Schema from a software package developed by Liquid Technologies Limited called Liquid XML Studio.

Example:

In diagrams such as the one above, for schema validation purposes, a box with a solid border indicates that data element is a required element. A box with a dotted line indicates an optional data element. Likewise, a solid line indicates a required field and a dotted line indicates an optional field. A plus (+) sign to the right of a box (enclosing a data field) indicates there is further branching from this data field that is not shown on the diagram.

Each diagram includes a representation of a field or data element’s repeatability. Under a given box, for example, “0...∞” would indicate an optional data element or field (with a minimum number of occurrences of zero) that can be repeated an infinite number of times. On the other hand, “1...3” would indicate a mandatory field (with at least one required instance) that can be repeated up to 3 times.

Under each diagram, a table will appear with five columns:

- **Tag Name**: This is the name of the data field that will appear in the schema and in the instance document. The instance document is the actual course inventory/catalog information with actual data from an actual institution that is being exchanged. The format for the tag name is Upper Camel Case which takes the English name such as Transmission Data and eliminates the space between the two words and retains the capital letters of each word to make up the tag name.

- **Schema Use**: This column indicates if the data element or field is required or optional in the instance document (actual course inventory/catalog information for an institution). If a field that is indicated as required in this column is not included in the instance document, the course inventory will normally be rejected by the receiving institution or agency’s computer program (XML Parser). There will also usually be an indication in this column if the field can be sent multiple times.

- **Description**: This is a brief description of the data included with that XML tag. This is normally taken from the description in the Core Main Schema for simple data elements.

- **Recommended Use**: This is a recommendation from the developers of the Educational Course Inventory Schema and is based on good practice from AACRAO and general recommended implementation practices for exchanging course inventory/catalog information.

- **Required**: If the schema use column indicates “Required”, then this column will also indicate required. However, it is possible for the schema use column to show ‘Optional’, yet the
Developers of this Guide feel it is essential to this schema. It will therefore be indicated as required to include the data in keeping with good practices in the AACRAO community.

**Recommended:** If the information for a field is available at the sending school, then ‘Recommended’ indicates that the field should be sent. This notation means that the developers of this Guide strongly feel that the data should be sent if it is available.

**Optional:** This indicates that it is strictly up to the sender to include the data or not. If it is normally included in a paper catalog, then the user will probably try to include it. There may be cases in specific state exchanges of course inventory information that items marked optional may be essential in that state. It may also be the case that all documents for the destination school might be received at a single location; thus the sender may need to provide Optional elements to identify the specific intended recipient.

**Not Recommended:** This is a recommendation by the developers of this Guide that the data not be sent. In the case of comments or notes, it is normally recommended that they not be included, since notes cannot normally be automatically be processed by the receiving school. An exception may be in a particular state where the note field is standardized for use in that one state and that formatted note (by prior agreement in that state) may be processed automatically by the receiving computer. In other cases, common practice may be to include data that is not recommended by AACRAO.

**Format:** This gives some parameters of how the data in a field is restricted by number of occurrences or length of the field.

- minOcc 1 indicates that this field is required and at least one occurrence must be included in the instance document. MinOcc 0 indicates that the field is optional for schema validation purposes.
- maxOcc 1 indicates that this field may only occur once in this position of the instance document; maxOcc 5 would indicate that the field may occur no more than 5 times in this position of the instance document.
- maxOcc ∞ indicates that there is no limit to the number of occurrences of the field in the instance document.
- minLength indicates the minimum number of characters that must be included in this field if the field is included in the instance document.
- maxLength indicates the maximum length of the field if it is included in the instance document.

**Comments:** The Guide may include comments beneath the rows of the table, and also at the end of the last row of the table. These comments are provided to further explain something in the table row immediately above the comment row.

**Code Illustration:** Below the table of Tag Names, the Guide includes an illustration (snippet) of what that portion (described above) of a possible instance document might include and look like in XML format.

**NoteMessage:** You will find NoteMessage appearing throughout the schema and this Implementation Guide. This Guide almost always recommends against the routine use of note messages. Unless there is a prior agreed upon format for a note message between the sender and the receiver of the XML Educational Course Inventory, the note message cannot be interpreted and automatically processed by the receiver’s computer. Therefore, the use of the note message is generally discouraged.

**UserDefinedExtensions:** The User-Defined Extension Design Pattern is intended to address situations where an XML Schema message specification may have to carry sender-specific data that cannot be defined at the time the message specification is designed. The Schema has to allow for additional elements to be defined and used at a later date. The User-Defined Extensions Pattern serves as a placeholder for these to-be-defined fields. However, it can require that these fields are defined in a Schema by the organization that wants to use the extensions area.
Care should be taken not to use the user-defined extensions as a fall-back for doing appropriate research and design. It should only be used when in actuality, the organization defining the base Schema cannot define the additional elements that other organizations may need, and furthermore, is not interested in the data these other organizations want to exchange in the user-defined area.

The use of User-defined Extensions is beneficial when agreed upon by both the sending and receiving institutions. For best work practice, it is recommended that User-defined Extensions be used within the following scope:

- Mutually defined sub-schemas: For the transmittal and receipt of data agreed upon by both sending and receiving institutions.
- State systems: In the California CSU system, this would the General Education requirements; UC would be the University of California requirements.
- Regional requirements

The benefit of using the User-defined Extensions is primarily the open nature of the xml design. Agreements may be designed to accommodate segments of data transmitted, which allows for the following:

- Allows strict standardization within system through design and implementation agreements.
- Users outside of the agreement may ignore the data defined in the User-defined Extensions as non-pertinent.
- No National standards must be agreed upon for use. Only the agreement between sending and receiving institutions.

Example Code:

```xml
<UserDefinedExtensions>
  <YearTerm>20042</YearTerm>
  <CourseAbbrev>ENG</CourseAbbrev>
  <CourseNumb>0114</CourseNumb>
  <SectNumb>02</SectNumb>
</UserDefinedExtensions>
```

Please reference Excerpt from PESC Guidelines for XML Architecture and Data Modeling page 46 (http://www.pesc.org/info/policies/PESC-Guidelines-for-XML-Architecture-and-Data-Modeling-v3-0.doc) for a full explanation on usage of this segment.

**Development History and Acknowledgments**

The AACRAO Committee on the Standardization of Postsecondary Education Electronic Data Exchange (SPEEDE) began working on a national standard format for the electronic exchange of postsecondary student records in 1989. Initially the work of the committee was funded by AACRAO. At about the same time, the US Department of Education’s National Center for Education Statistics (NCES) began developing a national standard format for the electronic exchange of student records for Kindergarten through high school students. The K12 community was primarily represented by the Council of Chief State School Officers (CCSSO). To gain more credibility in the creation and widespread adoption of the standards, the two groups (AACRAO and NCES) approached the American National Standards Institute’s (ANSI) Accredited Standards Committee (ASC) X12 for assistance in developing and approving the two standard formats.

ASC X12 reviewed the two proposals and insisted that only one standard be developed and approved. That standard would be the Kindergarten through Postsecondary Education Student Record. At that time, NCES decided to fund the work of the AACRAO SPEEDE Committee as well as those working on the K-12 standard. The ASC X12 standard was approved in the early 1990's as ANSI ASC X12 Transaction Set 130 for the Student Educational Record (Transcript). This was a standard in the Electronic Data Interchange or EDI format.
During this time period (before the Internet was widely available), an emphasis on the format was to send as much data as possible, using the fewest characters. This was because transmission costs were based on the number of characters or bytes being sent over the Value Added Electronic Networks (VANs).

This standard is now in use by a significant number of postsecondary institutions in the United States and Canada. Approximately 700,000 postsecondary transcripts are exchanged electronically in this EDI format through the University of Texas at Austin Internet Server in the ASC X12 EDI format each year.

Although the number of transcripts exchanged electronically in this ASC X12 EDI format is growing significantly each year, it was felt by the community that an alternative format should be explored.

PESC commissioned this exploration by creating the XML Forum to determine if an XML standard format might result in significantly increased use of an electronic exchange of student educational records.

It was felt that the perceived complexity of the process of implementation of the EDI standards was one of the reasons that the EDI format was not being used by many schools. The wide and inexpensive availability of XML software tools and the already existing and pervasive use of XML by many schools’ information technology staffs made the XML process appear to have a much better chance of rapid acceptance and implementation by postsecondary educational institutions.

The early efforts of the XML Forum emphasized the creation of standard core components. Once this work was significantly accomplished, PESC agreed to develop an XML Standard Format for the College Transcript to demonstrate that this could be done.

Bruce Marton from the University of Texas at Austin headed this effort and was largely supported by the AACRAO SPEEDE Committee that had developed the earlier EDI standard.

PESC approved the XML standard for the College Transcript in the summer of 2004.
Education Course Inventory

<table>
<thead>
<tr>
<th>Tag Name</th>
<th>Schema Use</th>
<th>Description</th>
<th>Recommended Use</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>TransmissionData</td>
<td>Required</td>
<td>Routing and header information</td>
<td>Required</td>
<td>minOcc 1 maxOcc 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Comment:</strong> This complex data element will be further expanded and explained on page 2 which follows.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CourseInventoryInformation</td>
<td>Required</td>
<td>Body of document. Information about individual courses and supporting data.</td>
<td>Required</td>
<td>minOcc 1 maxOcc 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Comment:</strong> This complex data element will be further expanded and explained on page 41 which follows.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NoteMessage</td>
<td>Optional</td>
<td>Additional information about course inventory</td>
<td>Not recommended</td>
<td>minOcc 0 maxOcc 80 minLength 1 maxLength 80</td>
</tr>
<tr>
<td></td>
<td>Repeatable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Comment:</strong> Although NoteMessage occurs frequently throughout this schema and Implementation Guide, it is almost always Not Recommended for inclusion. Of course, this is because it cannot normally be automatically processed by the receiving school’s or agency’s computer system. It may be recommended in some cases where a state or agency has established structured formats so that the receiving school’s or agency’s computer can process it automatically.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UserDefinedExtensions</td>
<td>Optional</td>
<td>Additional structured information. Requires mutually defined XML schema.</td>
<td>Optional</td>
<td>minOcc 0 maxOcc 1</td>
</tr>
</tbody>
</table>

Code illustration:

```xml
<EdCoIn:EducationCourseInventory xmlns:EdCoIn="urn:org:pesc:message:EducationalCourseInventory:v1.0.0" xmlns:AcRec="urn:org:pesc:sector:AcademicRecord:v1.6.0" xmlns:core="urn:org:pesc:core:CoreMain:v1.10.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:org:pesc:message:EducationalCourseInventory:v1.0.0 /EducationalCourseInventory_v1.0.0.xsd">
  <TransmissionData />
  ...
  <CourseInventoryInformation />
  ...
</EdCoIn:EducationCourseInventory>
```