

# amc2moodle

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## Abstract

amc2moodle, is conversion tool to recast multiple choice quiz written with the LaTeX format used by automultiplechoice 1.0.3 into the moodle XML quiz format.

It is based on LaTeXXML for a first step conversion of the LaTeX file into XML. Then a set of transformation is applied in python and with XSLT stylesheet to conform to moodle XML format. Most of LaTeX possibilities are supported (equations, tables, graphics, user defined commands). The question can then be imported in the moodle question bank using category tags.

The automultiplechoice LaTeX format is convenient and can be used for preparing test and avoiding moodle web gui for multiple choice questions.

## Contents

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# 1 Install

Dependencies :

- install python [tested with 3.7.6], lxml and wand libraries (on Ubuntu or macOS using python package manager pip: `pip install lxml wand`). A `sudo` command could be added in front of the previous command if necessary.
- install **LaTeXML**<sup>1</sup> [tested with version 0.8.4] from package (ubuntu : `sudo apt-get install latexml`) or from source. If you choose to compile it, please check on : <http://dlmf.nist.gov/LaTeXML/get.html> that all the dependencies are installed. This program does the first step of the conversion into XML. Note that some version of `latexml` present an error in

```
/usr/share/perl5/LaTeXML/Common/Error.pm line 364.  
To fix it, change line 364 in Error.pm to [[:cntrl:]]  
see https://bugs.debian.org/cgi-bin/bugreport.cgi?bug=839639
```

- install `xmindent` [optional]. This program can be used to indent well the XML file (ubuntu : `sudo apt-get install xmindent`).

Install :

- in the root folder of the `amc2moodle` (where `setup.py` is), run `pip install .` (the last character is a dot) or `python setup.py install` (the first command is recommended).
- the command `amc2moodle` is available on a terminal.

Uninstall :

- if the installation has been done with `pip install .` as recommended: uninstallation could be done with the command `pip uninstall amc2moodle`
- if the installation has been done with `python setup.py install` the install files could be remove manually in the `site-packages` and the `bin` folders of the used Python.

Note : The project `TeX2Quiz`, <https://github.com/hig3/tex2quiz>, is a similar project to translate multiple choice quiz into moodle XML, without connexion with AMC.

## 2 Usage

### 2.1 Command line call

Here is recall the `amc2moodle -h` output. Note that, “\”, stands for a line break.

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<sup>1</sup><http://dlmf.nist.gov/LaTeXML>

usage: amc2moodle.py [-h] [-o OUTPUT] [-k] [-c CATNAME] [inputfile]

This script converts a tex file of AMC questions into an xml file suitable for moodle import. Only question and questionmult environnement are ready! This GNU bash script is not fully compatible with Mac and path error may occurred. See issues on amc2moodle github page.

positional arguments:

inputfile Input TeX file (mandatory)

optional arguments:

-h, --help show this help message and exit  
-o OUTPUT, --output OUTPUT Output XML file (optional)  
-k, --keep Keep temporary file (useful for debugging) (optional)  
-c CATNAME, --catname CATNAME Use \element{label} as category tag as a subcategorie root\_cat\_name (optional)

## 2.2 Code structure

The command line calls a shell script `amc2moodle`. This script work with linux and mac. This script then call via a dedicated class (on `amc2moodle_class.py`)

- `LateXML` with `automultiplechoice.sty.ltxml`. The package has been made using `note` element in `LateXML` and most of AMC environment or command names are pass through attribute (in french for the moment). User command can be added in the `.tex` file. This first step is used to get an XML file `tex2xml.xml`. Thanks to `LateXML`, most  $\text{\LaTeX}$  possibilities are supported in the conversion to moodle. Note that option passed to `automultiplechoice.sty` package are ignored.
- `grading.py` with `lxml` is used to add data like grade, image conversion and additional attributes to ease XSLT stylesheet transformation. For the moment, 3 layers of XSLT are use i) `transform_ns.xslt` to remove the namespace added by `LateXML`, ii) `transform2html.xslt` to recast the image element, convert into html text style, tables and extract raw tex equations (instead of `mathml`). The html are embedded into CDATA markup. Note that image elements will appear twice i) in `<img>` elements present in the CDATA markup to html moodle rendering and ii) in `<file>` element in order to embedded the image file as text (base64). This elements are present at `<questiontext>` level or answer `<answer>` level. The last XSLT transform, performed by `transform.xslt` is used change the element name and conform to moodle XML format.

Note that i) moodle fill the missing element like feedback (see ??); ii) the global structure have been obtained by looking few questions created directly in moodle.

## 2.3 What you can do

- Convert `question` and `questionmult` environments.

- You don't need to remove questionnaires part `\exemplaire` or `\onecopy`. But if this part contains undefined commands, remove/comment it!
- Put in-line equations like  $x^2$  or use equation environment (or `$$` delimiters). For the moment `eqnarray` or the `amsmath` environments `multline`, `align` are not supported. The choice have been made to keep equation in `tex` and use `mathjax` filter of moodle for rendering. In my opinion, it is better for modifying question after importation.
- Include image, in all format supported by `WAnd`. `amc2moodle` will convert it in `.png` for moodle export. The image will be embedded as text (base64) in the output xml file. The folder is `'/'` in moodle. The image can be in an another folder than the `tex` file.
- Include Table, with the `tabular` environment. In the present form, `amc2moodle` put border around each cell.
- Use italic, typewriter, bold, emphasize. . .
- Automatically add an answer like "there is no good answer" if there is no good answer.
- Use user's command defined in the `LATEX` file.
- `\usepackage[utf8]{inputenc}` for accents
- Use packages that are supported by `LaTEX`. See the list at <http://d1mf.nist.gov/LaTeXML/manual/included.bindings/>. Instead you need to add a binding to `LaTEX`.
- Use `tikz`. `LaTEX` generates `svg` content, embedded in the question or answer html text.
- All answers are Shuffled by default, you can keep the answer initial order by setting `ShuffleAll = False` in `grading.py`

## 2.4 What you cannot do

- Use underscore in question name field !
- Use accentuated path (problem with `lxml` and `python2`)
- Use `verbatim`. This environment is not supported by `automultiplechoice` 1.0.3. Use `alltt` package instead.
- Use font size (easy to add)
- Use `amsmath` environments like `align`, `aligned`. . . Because `tex` attribute of `<equation>`, provided by `LaTEX` output, doesn't contains really the raw `tex` equation.
- Change border of table
- Use command like `\raggedright`, text align is not fully supported. this add align information into the `class` attribute of `<note>` and the string matching break down. Note that `\raggedright` is bypassed.

- Use `multicol`, it use is bypass `automultiplechoice.sty.ltxml` for choices layout. But it should be possible to use it elsewhere (create newcommand).
- Translate equation into `mathml`, but it can be easily changed
- Use AMC numeric question
- Only the main commands of the package `automultiplechoice.sty` are supported in french. The english keywords support is on-going. The list of supported keywords can be seen in `/src/automultiplechoice.sty.ltxml`
- You cannot remove the add of "None of these answers are correct" choice at the end of each multiple question.

## 2.5 Troubleshooting

Error 'convert: not authorized..' see ImageMagick policy.xml file

## 3 Grading strategy

In moodle 3, the grading strategy is different from AMC especially for question with multiple answers. In this case, AMC affects a grade for each checked good answer and each non-checked wrong answer. The total grade of the question depend on the number of choice.

In Moodle and here, only checked item leads to a grade, positive or negative. The grading is compute in the `grading.py` script. The default grading parameter are set in `grading.py` script to

```
# Multiple :: e :incoh rence, b: bonne, m: mauvaise, p: plan  
amc_bs = {'e':-1,'b':1,'m':-0.5}
amc_bm = {'e':-1,'b':1,'m':-0.5, 'p':-1}
# default question grade in moodle
moo_defaultgrade = 1.
```

This value can be changed (as in AMC) with the tex command

```
\baremeDefaultS{e=-0.5,b=1,m=-0.5} % never put b<1,
\baremeDefaultM{e=-0.5,b=1,m=-0.25,p=-0.5} % never put b<1,
```

or at the question level with the tex command `bareme`. The gade  $g_i$  in % is then computed as  $g_i = 100 \cdot c_i / N_i$  where  $i$  stand for the good or the wrong answer. Here,  $N_i$  is the total number of the good or the wrong answer and  $c_i$  the coefficient (m, b...). It important to set `b=1` to get 100% if all the good answers are found. The `e` parameter is not used here, because it is not possible to tick 2 answers in moodle for one-answer-question. The only case where incoherent can be used is if the "*there isn't any correct answer*" answer is ticked with another question but it is not implemented. For instance if `m=-0.5` and `b=1`, a student who ticks all the wrong answers get -0.5, a student who ticks all the good answer get 1 and student who ticks all the boxes get 0.5.

Another difference is that moodle 3 use tabulated grade like : 1/2, 1/3, 1/4, 1/5, 1/6, 1/7, 1/8, 1/9, 1/10 and their multiple. If your grade are not conform to that you must use : 'Nearest grade if not listed' in import option in the moodle question bank. But check at least that the sum of good answer give 100% !

## 4 Categories

By default, the imported questions are all created in *course/filein*. When the flag `-c` is used, the AMC command `element` is used to create subcategories and the argument following `-c` `catname` is used instead of `filein`. Each question is then placed in *course/catname/elementName*. This part is set in `grading.py`.

## 5 Feedback

Feedback are present, in a certain way, in `automultiplechoice` with the `\explain` command. This part is not yet implemented in `amc2moodle`. However it could be easy to add it at the response or question level as other fields and bypass them for real `automultiplechoice` test.

## 6 Import in Moodle

## 7 Example

A complete example to illustrate the possibilities of `amc2moodle`, is given in `/test/QCM.tex`, an extract is given below to illustrate the syntax

```
\element{cat1}{ % use category and sub-category to classify questions
\begin{questionmult}{QLabel}
\bareme{e=-0.5,b=1,m=-1.,p=-0.5} % never put b<1,
Quel fruit possède un noyau ?
\begin{reponses}
\mauvaise{La pomme}
\mauvaise{La tomate}
\mauvaise{le Kiwi}
\end{reponses}
\end{questionmult}
}
```



+1/1/60+

Test

Nom et prénom :

.....

Certaine question peuvent sembler étrange, c'est le but !

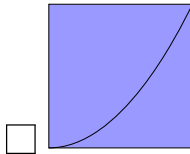
## QCM USING AMC LATEX FORMAT

**Question 1 ♣** Among the following cities, which ones are French prefectures?

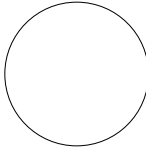
- ☐ Avignon
- ☐ Sainte-Menehould
- ☐ Poitiers
- ☐ *Aucune de ces réponses n'est correcte.*

**Question 2** Among the following shape, where is the circle

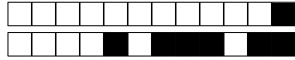
☐  $\triangle$



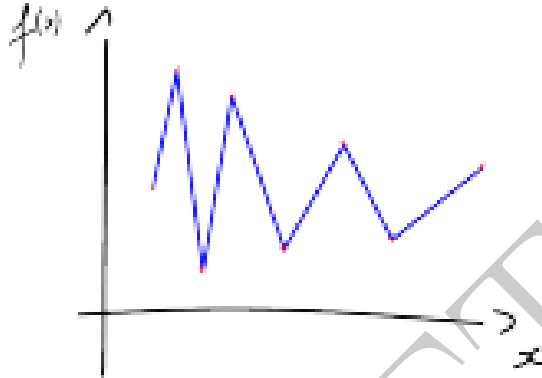
☐



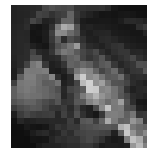
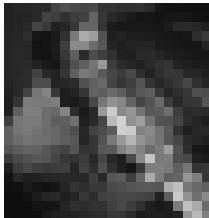
☐



**Question 3** On souhaite faire passer *exactement*, par  $N$  points donnés, un **polynôme** de degré **strictement** égal à  $N - 1$ . Pour trouver les coefficients on doit résoudre un *problème*



- ☐ de moindre carré  
☐ de Thelonius Sphere Monk



- ☐ d'interpolation

**Question 4** Among the following persons, which one has ever been a President of the French Republic?


- ☐ Marcel Proust    ☐ with an image     ☐ René Coty    ☐ Alain Prost





**Question 5 ♣** Quels sont les opérations qui donnent un chiffre présent dans le tableau?

12	2	$2^3$
Deux	4	

- ☐ la réponse en image 
- ☐  $6 \times 6$
- ☐  $|-10 - 2|$  (math inline and newcommand)
- ☐ Avec une équation matricielle

$$\det \begin{pmatrix} 1 & 2 \\ -1 & 10 \end{pmatrix} = \begin{vmatrix} 1 & 2 \\ -1 & 10 \end{vmatrix} \quad (1)$$

- ☐ Ou en C using `alltt` package

```
int s=-2;
for (int i=0;i<4; i++){
s=i*i+s;
}
```

- ☐ Avec une équation

$$\int_0^2 x dx$$

- ☐ Aucune de ces réponses n'est correcte.

**Question 6 ♣** Quel fruit possède un noyau?

- ☐ La tomate      ☐ le Kiwi      ☐ La pomme
- ☐ Aucune de ces réponses n'est correcte.

## 8 To do list

All the points listed in sec. ?? can be push on this list, among them

- Add mathml support
- Add other equation environnement in raw tex
- All multi-langage support of `automultiplechoice.sty` and really implement all the `automultiplechoice.sty` command!
- Add AMC numeric question support
- Add a support for listing or verbatim environment. For the moment, `alltt` seems to be supported.
- Add a support for feedback with `\explain` command