

The lua-unicode-math package*

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<https://github.com/zauguin/lua-unicode-math>

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Modern fonts are usually provided in OpenType format and are designed for Unicode based input. For mathematical fonts this usually means the use of fonts with an OpenType MATH table: Fonts containing special metadata needed to make them usable in a mathematical context.

In Lua \TeX such fonts have traditionally been loaded with the `unicode-math` package. While this works, is very flexible and allows to use the same document in Xe \TeX and Lua \TeX it has performance issues and it sometimes has unexpected interactions with the use of math versions. The `lua-unicode-math` is a specific Lua \LaTeX specific alternative which aims for higher performance and better integration with native Lua \TeX features.

1 Usage instructions

1.1 Font packages

For most Opentype the recommended way to load them with `lua-unicode-math` is to use a dedicated package. Currently the following packages are shipped with `lua-unicode-math`:

Font	Package
Latin Modern Math	<code>lum-lmodern</code>
New Computer Modern Math	<code>lum-newcomputermodern</code>
STIX2	<code>lum-stix2</code>
XITS	<code>lum-xits</code>
TeX Gyre Pagella Math	<code>lum-pagella</code>
TeX Gyre DejaVu Math	<code>lum-dejavu</code>
TeX Gyre Bonum Math	<code>lum-bonum</code>
TeX Gyre Schola Math	<code>lum-schola</code>
TeX Gyre Termes Math	<code>lum-termes</code>
Fira Math	<code>lum-fira</code>

1.2 Loading fonts by name

If you want to use a custom font, you can load `fontspec` and `lua-unicode-math` using

```
\usepackage{fontspec,lua-unicode-math}
```

*This document corresponds to `lua-unicode-math` v0.2, dated 2025-12-11.

This will load Latin Modern Math by default. Another math font can be loaded using `\setmathfont` using the same options as `fontspec`'s `\newfontfamily`. For example, you can use to to configure the current math font using

```
\setmathfont[AutoFakeBold=1]{Latin Modern Math}
```

1.3 Writing maths

There are two ways of entering math: You can directly input Unicode math symbols or use regular L^AT_EX commands for symbols. All Unicode symbols are supported with the same commands as in `unicode-math`. For a full list see `texdoc unimath-symbols`.

2 Implementation

```

1 \ProvidesExplPackage
2   {lua-unicode-math}
3   {2025-12-11}
4   {0.2}
5   {Opentype Math support for LuaLaTeX}
6
7 <@=l_uni_math>
8 \int_new:N \g__l_uni_math_font_count_int
9 \tl_new:N \l__l_uni_math_main_family_tl
10 \tl_new:N \l__l_uni_math_script_family_tl
11 \tl_new:N \l__l_uni_math_scriptscript_family_tl
12
13 \cs_generate_variant:Nn \tl_if_eq:nnT {o}
14
15 \msg_new:nnn { l_uni_math } { unicode-math-suppressed } {
16   You~tried~to~load~both~lua-unicode-math~and~unicode-math~
17   in~the~same~document.~This~is~not~supported,~unicode-math~
18   will~be~suppressed.~There~is~a~good~chance~that~this~will~
19   break~your~document.~Change~your~document~to~only~use~lua-unicode-math~
20   so~solve~this.
21 }
22 \msg_new:nnn { l_uni_math } { unicode-math-loaded } {
23   You~tried~to~load~lua-unicode-math~while~unicode-math~
24   was~already~loaded.~This~does~not~work.~Please~avoid~loading~
25   unicode-math.~If~that~is~not~possible~and~you~are~feeling~adventurous~
26   you~can~try~loading~the~lua-unicode-math~package~at~the~beginning~
27   of~your~document~instead~to~suppress~unicode-math.
28 }
29 \disable@package@load{unicode-math} {
30   \msg_warning:nn { l_uni_math } {unicode-math-incompatible }
31 }
32 \IfPackageLoadedTF {unicode-math} {
33   \msg_critical:nn { l_uni_math } {unicode-math-loaded }
34 } {}
35
36
37 \cs_if_exist:NF \DeclareMathScriptfontMapping {
38   \cs_new:Npn \DeclareMathScriptfontMapping #1 #2 #3 #4 #5 #6 {
39     \cs_set:cpx { scriptfont__l_uni_math #1 / #2 } { #3 / #4 }

```

```

40   \cs_set:cpx { scriptscriptfont__l__uni__math #1 / #2 } { #5 / #6 }
41 }
42 \cs_set:Npn \__l__uni__math_family_variant:nw #1 #2/#3/ {
43   \ifcsname #1__l__uni__math#2/#3 \endcsname
44     \lastnamedcs
45   \else
46     #2/#3
47   \fi
48 /
49 }
50
51 % Hook into the kernel to allow different families in scriptfonts
52 \cs_set:Npn \getanddefine@fonts #1 #2 {
53   \xdef\font@name{\csname \string#2/\tf@size\endcsname}
54   \pickup@font \let\textfont@name\font@name
55   \xdef\font@name{\csname \exp_last_unbraced:Nno \__l__uni__math_family_variant:nw {scriptfont
56   \pickup@font \let\scriptfont@name\font@name
57   \xdef\font@name{\csname \exp_last_unbraced:Nno \__l__uni__math_family_variant:nw {scriptfont
58   \pickup@font
59   \edef\math@fonts{\math@fonts
60     \textfont#1\textfont@name
61     \scriptfont#1\scriptfont@name
62     \scriptscriptfont#1\font@name}
63 }
64 }
65
66 \hook_gput_code:nnn { package/fontspect/after } {.} {
67   \bool_gset_false:N \g__fontspec_math_bool
68
69   \NewDocumentCommand \setmathfont { 0{ } m 0{ } } {
70     \int_incr:N \g__l__uni__math_font_count_int
71     \exp_args:Nc \newfontfamily
72       { \g__l__uni__math_font_ \int_use:N \g__l__uni__math_font_count_int _text_font }
73       { #2 }
74     [ #1, #3, Script = Math, Renderer = Base ]
75     \tl_set_eq:NN \l__l__uni__math_main_family_tl \l_fontspec_family_tl
76
77     \exp_args:Nc \newfontfamily
78       { \g__l__uni__math_font_ \int_use:N \g__l__uni__math_font_count_int _script_font }
79       { #2 }
80     [ #1, #3, Script = Math, Renderer = Base, Style = MathScript ]
81     \tl_set_eq:NN \l__l__uni__math_script_family_tl \l_fontspec_family_tl
82
83     \exp_args:Nc \newfontfamily
84       { \g__l__uni__math_font_ \int_use:N \g__l__uni__math_font_count_int _scriptscript_font }
85       { #2 }
86     [ #1, #3, Script = Math, Renderer = Base, Style = MathScriptScript ]
87     \tl_set_eq:NN \l__l__uni__math_scriptscript_family_tl \l_fontspec_family_tl
88
89     \DeclareMathScriptfontMapping {TU} {\l__l__uni__math_main_family_tl} {TU} {\l__l__uni__math_s
90
91     \exp_args:NnnV \DeclareSymbolFont {lummain} {TU} \l__l__uni__math_main_family_tl {m} {n}
92     \exp_args:NnnnV \SetSymbolFont {lummain} {bold} {TU} \l__l__uni__math_main_family_tl {b} {n}
93 }

```

```

94
95 \cs_set:Nn \__fontspec_setmainfont_hook:nn
96 {
97   \tl_if_eq:onT {\g__fontspec_mathrm_tl} {\rmdefault}
98   {
99     \fontspec_gset_family:Nnn \g__fontspec_mathrm_tl {Renderer=Basic,#1} {#2}
100     \__fontspec_setmathrm_hook:nn {#1} {#2}
101   }
102 }
103 \cs_set:Nn \__fontspec_setsansfont_hook:nn
104 {
105   \tl_if_eq:onT {\g__fontspec_mathsf_tl} {\sfdefault}
106   {
107     \fontspec_gset_family:Nnn \g__fontspec_mathsf_tl {Renderer=Basic,#1} {#2}
108     \__fontspec_setmathsf_hook:nn {#1} {#2}
109   }
110 }
111 \cs_set:Nn \__fontspec_setmonofont_hook:nn
112 {
113   \tl_if_eq:onT {\g__fontspec_mathtt_tl} {\ttdefault}
114   {
115     \fontspec_gset_family:Nnn \g__fontspec_mathtt_tl {Renderer=Basic,#1} {#2}
116     \__fontspec_setmathtt_hook:nn {#1} {#2}
117   }
118 }
119 \cs_set:Nn \__fontspec_setmathrm_hook:nn
120 {
121   \SetMathAlphabet \mathrm { normal } \g_fontspec_encoding_tl \g__fontspec_mathrm_tl { \m
122   \SetMathAlphabet \mathit { normal } \g_fontspec_encoding_tl \g__fontspec_mathrm_tl { \m
123   \SetMathAlphabet \mathbf { normal } \g_fontspec_encoding_tl \g__fontspec_mathrm_tl { \b
124 }
125 \cs_set:Nn \__fontspec_setboldmathrm_hook:nn
126 {
127   \SetMathAlphabet \mathrm { bold } \g_fontspec_encoding_tl \g__fontspec_bfmathrm_tl { \m
128   \SetMathAlphabet \mathit { bold } \g_fontspec_encoding_tl \g__fontspec_bfmathrm_tl { \m
129   \SetMathAlphabet \mathbf { bold } \g_fontspec_encoding_tl \g__fontspec_bfmathrm_tl { \b
130 }
131 \cs_set:Nn \__fontspec_setmathsf_hook:nn
132 {
133   \SetMathAlphabet \mathsf { normal } \g_fontspec_encoding_tl \g__fontspec_mathsf_tl { \m
134   \SetMathAlphabet \mathsf { bold } \g_fontspec_encoding_tl \g__fontspec_mathsf_tl { \bfs
135 }
136 \cs_set:Nn \__fontspec_setmathtt_hook:nn
137 {
138   \SetMathAlphabet \mathtt { normal } \g_fontspec_encoding_tl \g__fontspec_mathtt_tl { \m
139   \SetMathAlphabet \mathtt { bold } \g_fontspec_encoding_tl \g__fontspec_mathtt_tl { \bfs
140 }
141 %
142 \__fontspec_setmathrm_hook:nn {} {}
143 \__fontspec_setmathsf_hook:nn {} {}
144 \__fontspec_setmathtt_hook:nn {} {}
145 }
146
147 \cs_set_protected:Npn \operator@font {

```

```

148 \@fontswitch { \font@warning{Math-mode-required-for-\string\operator@font.} } { \mathtextrm
149 }
150
151 \DeclareSymbolFont {lummain} {TU} {lmm} {m} {n}
152 \SetSymbolFont {lummain} {bold} {TU} {lmm} {b} {n}
153
154 \newattribute \mathfamattr
155
156 \lua_load_module:n { lua-unicode-math }
157
158 \prop_set_from_keyval:Nn \l_tmpa_prop {
159   rm = 0, bf = 1, it = 2, bfit = 3,
160   sf = 4, sfbf = 5, sfit = 6, sfbfit = 7,
161   cal = 8, calbf = 9,
162   frak = 12, frakbf = 13,
163   tt = 16,
164   bb = 20,
165 }
166 \prop_map_inline:Nn \l_tmpa_prop {
167   \cs_new_protected:cpn { sym #1 } ##1 {
168     {
169       \mathfamattr = #2 \scan_stop:
170       ##1
171     }
172   }
173   \cs_if_exist:cTF { math #1 } {
174     \cs_set_eq:cc { mathtext #1 } { math #1 }
175     % \cs_set_eq:cc { math #1 } { sym #1 }
176   } {
177     \cs_set_eq:cc { math #1 } { sym #1 }
178   }
179 }
180
181 \clist_map_inline:nn { cal, calbf, frak, frakbf, bb } {
182   \cs_set_eq:cc { math #1 } { sym #1 }
183 }
184
185 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathord :nn } #1 #2 {
186   \cs_set:Npx #1 {
187     \char_generate:nn {#2} {12}
188   }
189 }
190 \tl_map_inline:nn {\mathbin \mathclose \mathpunct \mathrel} {
191   \cs_new_eq:cc
192     { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N #1 :nn }
193     { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathord :nn }
194 }
195
196 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathop :nn } #1 #2 {
197   \exp_args:Nc \Umathchardef { \cs_to_str:N #1 op } 1~\symlummain #2~
198   \cs_set_eq:cN { \cs_to_str:N #1 oplimits } \scan_stop:
199   \cs_set:Npx #1 {
200     \char_generate:nn {#2} {12}
201   }

```

```

202 \mathcode #2 = "8000~
203 \cs_set:cpx { \char_generate:nn {"FFFF"} {12} \char_generate:nn {#2} {12} } {
204   \use:c { \cs_to_str:N #1 op }
205   \use:c { \cs_to_str:N #1 oplimits }
206 }
207 }
208
209 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathopen :nn } #1 #2 {
210   \token_if_eq_meaning:NNTF #1 \sqrt {
211     \cs_set:Npx \sqrtsign {
212       \Uradical \symlummain #2~
213     }
214     \cs_set:Npx \root ##1 \of {
215       \Uroot \symlummain #2~ { ##1 }
216     }
217   }{
218     \cs_set:Npx #1 {
219       \char_generate:nn {#2} {12}
220     }
221   }
222 }
223
224 \group_begin:
225 \cs_set:Npn \l_tmp_cs:n #1 {
226   \group_end:
227
228   \cs_new_protected:Npn \__l_uni_math__check_mup_helper:w ##1 #1 ##2 \q_mark ##3 ##4 \q_stop
229     ##3 {##2}
230 }
231
232 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathalpha :nn } ##1 ##2 {
233   \cs_set:Npx ##1 {
234     \char_generate:nn {##2} {12}
235   }
236   \exp_after:wN \__l_uni_math__check_mup_helper:w \token_to_str:N ##1 \q_mark \cs_set_eq:CN
237 }
238 }
239
240 \exp_args:No \l_tmp_cs:n {
241   \token_to_str:N \mup
242 }
243
244 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathfence :nn } #1 #2 {
245   \cs_set:Npx #1 {
246     \char_generate:nn {#2} {12}
247   }
248   \cs_set:cpx {l \cs_to_str:N #1} {
249     \Udelimiter 4 ~ \symlummain #2 ~
250   }
251   \cs_set:cpx {r \cs_to_str:N #1} {
252     \Udelimiter 5 ~ \symlummain #2 ~
253   }
254 }
255

```

```

256 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccent :nn } #1 #2 {
257   \cs_set:Npx #1 {
258     \Umathaccent fixed 0 ~ \symlummain #2 ~
259   }
260 }
261
262 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathbotaccent :nn } #1 #2 {
263   \cs_set:Npx #1 {
264     \exp_not:N \PackageError{lua-unicode-math}{Unsupported-type-\token_to_str:N \mathbotaccen
265   }
266 }
267
268 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccentwide :nn } #1 #2 {
269   \cs_set:Npx #1 {
270     \Umathaccent 0 ~ \symlummain #2 ~
271   }
272 }
273
274 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathbotaccentwide :nn } #1 #2 {
275   \cs_set:Npx #1 {
276     \Umathaccent bottom 0 ~ \symlummain #2 ~
277   }
278 }
279
280 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccentoverlay :nn } #1 #2 {
281   \cs_set:Npx #1 {
282     \Umathaccent overlay 0 ~ \symlummain #2 ~
283   }
284   % \cs_set:Npx #1 {
285   %   \exp_not:N \PackageError{lua-unicode-math}{Unsupported-type-\token_to_str:N \mathaccent
286   % }
287 }
288
289 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathover :nn } #1 #2 {
290   \cs_set:Npx #1 {
291     \exp_not:N \PackageError{lua-unicode-math}{Unsupported-type-\token_to_str:N \mathover}{-}
292   }
293 }
294
295 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathunder :nn } #1 #2 {
296   \cs_set:Npx #1 {
297     \exp_not:N \PackageError{lua-unicode-math}{Unsupported-type-\token_to_str:N \mathunder}{-}
298   }
299 }
300
301 \cs_generate_variant:Nn \exp_args:Ne {c}
302 \cs_new:Npn \UnicodeMathSymbol #1 #2 #3 #4 {
303   \use:c { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N #3 :nn }
304   {#2} {#1}
305 }
306 \input {unicode-math-table}
307 \cs_undefine:N \UnicodeMathSymbol
308
309 \cs_set_protected:Npn \triangle { \mathord { \bigtriangleup } }

```

```

310 \cs_set_protected:Npn \mathellipsis { \mathinner { \unicodeellipsis } }
311 \cs_set_protected:Npn \cdots { \mathinner { \codecdots } }
312
313 \clist_map_inline:nn {
314   \to \rightarrow,
315   \le \leq,
316   \ge \geq,
317   \neq \neq,
318   \bigcirc \mdlgwhtcircle,
319   \circ \vysmwhtcircle,
320   \bullet \smlkcircle,
321   \mathyen \yen,
322   \mathsterling \sterling,
323   \diamond \smwhtdiamond,
324   \emptyset \varnothing,
325   \hbar \hslash,
326   \land \wedge,
327   \lor \vee,
328   \owns \ni,
329   \gets \leftarrow,
330   \mathring \ocirc,
331   \lnot \neg,
332   \longdivision \longdivisionsign,
333   \backepsilon \upbackepsilon,
334   \eth \matheth,
335   \dotsb@ \cdots,
336   \@cdots \cdots,
337 } {
338   \cs_set_eq:NN #1
339 }
340
341 \cs_set_eq:NN \intoplimits \nolimits
342
343 \cs_set_protected:cpx { \char_generate:nn {"FFFF"} {12} ' } {
344   \prime_helper:w "2032~
345 }
346
347 \cs_set_protected:Npn \uproot #1 {
348   \__l_uni_math_uproot:w #1 \scan_stop:
349 }
350
351 \cs_set_protected:Npn \leftroot #1 {
352   \__l_uni_math_leftroot:w #1 \scan_stop:
353 }

```