

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 LuaTeX 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 XeTeX and LuaTeX it has performance issues and it sometimes has unexpected interactions with the use of math versions. The `lua-unicode-math` is a specific LuaLaTeX specific alternative which aims for higher performance and better integration with native LuaTeX 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>
GFS Neohellenic Math	<code>lum-gfsneohellenic</code>
Erewhon Math	<code>lum-erewhon</code>
XCharter Math	<code>lum-xcharter</code>
Concrete Math	<code>lum-concrete</code>

*This document corresponds to `lua-unicode-math` v0.5, dated 2026-01-11.

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 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   {2026-01-11}
4   {0.5}
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 } { engine-unsupported } {
16   lua-unicode-math~can~only~be~used~with~LuaTeX.
17 }
18
19 \sys_if_engine luatex:F {
20   \msg_critical:nn { l_uni_math } { engine-unsupported }
21 }
22
23 \msg_new:nnn { l_uni_math } { unicode-math-suppressed } {
24   You~tried~to~load~both~lua-unicode-math~and~unicode-math~
25   in~the~same~document.~This~is~not~supported,~unicode-math~
26   will~be~suppressed.~There~is~a~good~chance~that~this~will~
27   break~your~document.~Change~your~document~to~only~use~lua-unicode-math~
28   so~solve~this.
29 }
30 \msg_new:nnn { l_uni_math } { unicode-math-loaded } {
31   You~tried~to~load~lua-unicode-math~while~unicode-math~
32   was~already~loaded.~This~does~not~work.~Please~avoid~loading~
33   unicode-math.~If~that~is~not~possible~and~you~are~feeling~adventurous~
34   you~can~try~loading~the~lua-unicode-math~package~at~the~beginning~
```

```

35   of~your~document~instead~to~suppress~unicode-math.
36 }
37 \disable@package@load{unicode-math} {
38   \msg_warning:nn { l_uni_math } {unicode-math-incompatible }
39 }
40 \IfPackageLoadedTF {unicode-math} {
41   \msg_critical:nn { l_uni_math } {unicode-math-loaded }
42 } {}
43
44
45 \IfFormatAtLeastTF{2026/01/01}{}{
46   \cs_set:Npn \DeclareMathScriptfontMapping #1 #2 #3 #4 #5 #6 {
47     \cs_gset:cpn { __nfss_mapped_scriptfont_family_sf_ #1 / #2 } { #3 / #4 }
48     \cs_gset:cpn { __nfss_mapped_scriptfont_family_ssf_ #1 / #2 } { #5 / #6 }
49   }
50 }
51
52 \hook_gput_code:nnn { package/fontspect/after } {.} {
53   \bool_gset_false:N \g__fontspec_math_bool
54
55   \NewDocumentCommand \setmathfont { O{} m O{} } {
56     \int_incr:N \g__l_uni_math_font_count_int
57     \exp_args:Nc \newfontfamily
58       { g__l_uni_math_font_ \int_use:N \g__l_uni_math_font_count_int _text_font }
59       { #2 }
60     [ #1, #3, Script = Math, Renderer = Base ]
61     \tl_set_eq:NN \l__l_uni_math_main_family_tl \l_fontspec_family_tl
62
63     \exp_args:Nc \newfontfamily
64       { g__l_uni_math_font_ \int_use:N \g__l_uni_math_font_count_int _script_font }
65       { #2 }
66     [ #1, #3, Script = Math, Renderer = Base, Style = MathScript ]
67     \tl_set_eq:NN \l__l_uni_math_script_family_tl \l_fontspec_family_tl
68
69     \exp_args:Nc \newfontfamily
70       { g__l_uni_math_font_ \int_use:N \g__l_uni_math_font_count_int _scriptscript_font }
71       { #2 }
72     [ #1, #3, Script = Math, Renderer = Base, Style = MathScriptScript ]
73     \tl_set_eq:NN \l__l_uni_math_scriptscript_family_tl \l_fontspec_family_tl
74
75     \DeclareMathScriptfontMapping {TU} {\l__l_uni_math_main_family_tl} {TU} {\l__l_uni_math_s
76
77     \exp_args:NnnV \DeclareSymbolFont {lummain} {TU} \l__l_uni_math_main_family_tl {m} {n}
78     \exp_args:NnnV \SetSymbolFont {lummain} {bold} {TU} \l__l_uni_math_main_family_tl {b} {n
79   }
80
81   \cs_set:Nn \__fontspec_setmainfont_hook:nn
82     {
83       \tl_if_eq:onT {\g__fontspec_mathrm_tl} {\rmdefault}
84       {
85         \fontspec_gset_family:Nnn \g__fontspec_mathrm_tl {Renderer=Basic,#1} {#2}
86         \__fontspec_setmathrm_hook:nn {#1} {#2}
87       }
88     }

```

```

89 \cs_set:Nn \__fontspec_setsansfont_hook:nn
90 {
91   \tl_if_eq:onT {\g__fontspec_mathsf_tl} {\sfdefault}
92   {
93     \fontspec_gset_family:Nnn \g__fontspec_mathsf_tl {Renderer=Basic,#1} {#2}
94     \__fontspec_setmathsf_hook:nn {#1} {#2}
95   }
96 }
97 \cs_set:Nn \__fontspec_setmonofont_hook:nn
98 {
99   \tl_if_eq:onT {\g__fontspec_mathtt_tl} {\ttdefault}
100   {
101     \fontspec_gset_family:Nnn \g__fontspec_mathtt_tl {Renderer=Basic,#1} {#2}
102     \__fontspec_setmathtt_hook:nn {#1} {#2}
103   }
104 }
105 \cs_set:Nn \__fontspec_setmathrm_hook:nn
106 {
107   \SetMathAlphabet \mathrm { normal } \g_fontspec_encoding_tl \g__fontspec_mathrm_tl { \m
108   \SetMathAlphabet \mathit { normal } \g_fontspec_encoding_tl \g__fontspec_mathrm_tl { \m
109   \SetMathAlphabet \mathbf { normal } \g_fontspec_encoding_tl \g__fontspec_mathrm_tl { \b
110 }
111 \cs_set:Nn \__fontspec_setboldmathrm_hook:nn
112 {
113   \SetMathAlphabet \mathrm { bold } \g_fontspec_encoding_tl \g__fontspec_bfmathrm_tl { \m
114   \SetMathAlphabet \mathit { bold } \g_fontspec_encoding_tl \g__fontspec_bfmathrm_tl { \m
115   \SetMathAlphabet \mathbf { bold } \g_fontspec_encoding_tl \g__fontspec_bfmathrm_tl { \b
116 }
117 \cs_set:Nn \__fontspec_setmathsf_hook:nn
118 {
119   \SetMathAlphabet \mathsf { normal } \g_fontspec_encoding_tl \g__fontspec_mathsf_tl { \m
120   \SetMathAlphabet \mathsf { bold } \g_fontspec_encoding_tl \g__fontspec_mathsf_tl { \bfs
121 }
122 \cs_set:Nn \__fontspec_setmathtt_hook:nn
123 {
124   \SetMathAlphabet \mathtt { normal } \g_fontspec_encoding_tl \g__fontspec_mathtt_tl { \m
125   \SetMathAlphabet \mathtt { bold } \g_fontspec_encoding_tl \g__fontspec_mathtt_tl { \bfs
126 }
127 %
128 \__fontspec_setmathrm_hook:nn {} {}
129 \__fontspec_setmathsf_hook:nn {} {}
130 \__fontspec_setmathtt_hook:nn {} {}
131 }
132
133 \cs_set_protected:Npn \operator@font {
134   \@fontswitch { \font@warning{Math-mode-required-for-\string\operator@font.} } { \mathtextrm
135 }
136
137 \DeclareSymbolFont {lummy} {TU} {lmm} {m} {n}
138 \SetSymbolFont {lummy} {bold} {TU} {lmm} {b} {n}
139
140 \newattribute \mathfamattr
141
142 \cs_if_exist:NF \slimits@ {

```

```

143 \cs_set_eq:NN \slimits@ \displaylimits
144 }
145 \cs_if_exist:NF \ilimits@ {
146 \cs_set_eq:NN \ilimits@ \nolimits
147 }
148 \chardef \g_l_uni_math_dots_binary_char = `
149 \chardef \g_l_uni_math_dots_comma_char = `...
150 \chardef \g_l_uni_math_dots_int_char = `
151 \chardef \g_l_uni_math_dots_other_char = `...
152
153 \cs_set_protected:Npn \DOTSB {
154 \__l_uni_math_set_previous_dots_type:w \g_l_uni_math_dots_binary_char
155 }
156
157 \cs_set_protected:Npn \DOTSX {
158 \__l_uni_math_set_previous_dots_type:w \g_l_uni_math_dots_other_char
159 }
160
161 \cs_set_protected:Npn \DOTSI {
162 \__l_uni_math_set_previous_dots_type:w \g_l_uni_math_dots_int_char
163 }
164
165 \cs_set_protected:Npn \DOTSC {
166 \__l_uni_math_set_previous_dots_type:w \g_l_uni_math_dots_comma_char
167 }
168
169 \lua_load_module:n { lua-unicode-math }
170
171 \prop_set_from_keyval:Nn \l_tmpa_prop {
172 up = 0, bfup = 1, it = 2, bfit = 3,
173 sfup = 4, bfsfup = 5, sfit = 6, bfsfit = 7,
174 cal = 8, bfcalf = 9,
175 frak = 12, bffrak = 13,
176 tt = 16,
177 bb = 20,
178 bf = 1024,
179 normal = -"7FFFFFFF,
180 literal = -1,
181 }
182 \cs_set_eq:NN \mathup \mathrm
183 \prop_map_inline:Nn \l_tmpa_prop {
184 \cs_new_protected:cpn { sym #1 } ##1 {
185 {
186 \mathfamattr = #2 \scan_stop:
187 ##1
188 }
189 }
190 \cs_if_exist:cTF { math #1 } {
191 \cs_set_eq:cc { mathtext #1 } { math #1 }
192 } {
193 \cs_set_eq:cc { math #1 } { sym #1 }
194 }
195 }
196 \cs_set_eq:NN \mathtextrm \mathrm

```

```
197 \cs_set_eq:NN \symrm \symup
```

In unicode-math there is a package option to use italic or upright letters for `\symsf` and `\ymbfsf`. Depending on the setting these become aliases for `\symsfup` and `\ymbfsfup` or `\symsfit` and `\ymbfsfit`. Since we do not want package option, we always use upright letters and you can redefine `\symsf` and `\ymbfsf` if you want to change it.

```
198 \cs_set_eq:NN \mathtextsf \mathsf
```

```
199 \cs_set_eq:NN \symsf \symsfup
```

```
200 \cs_set_eq:NN \ymbfsf \ymbfsfup
```

```
201
```

```
202 \clist_map_inline:nn { cal, calbf, frak, frakbf, bb } {
```

```
203   \cs_set_eq:cc { math #1 } { sym #1 }
```

```
204 }
```

```
205
```

```
206 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathord :nn } #1 #2 {
```

```
207   \cs_set:Npx #1 {
```

```
208     \char_generate:nn {#2} {12}
```

```
209   }
```

```
210 }
```

```
211 \tl_map_inline:nn {\mathbin \mathclose \mathpunct \mathrel} {
```

```
212   \cs_new_eq:cc
```

```
213     { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N #1 :nn }
```

```
214     { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathord :nn }
```

```
215 }
```

```
216
```

```
217 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathop :nn } #1 #2 {
```

```
218   \exp_args:Nc \Umathchardef { \cs_to_str:N #1 op } 1~\symlummain #2~
```

```
219   \cs_set:Npx #1 {
```

```
220     \char_generate:nn {#2} {12}
```

```
221   }
```

```
222   \mathcode #2 = "8000~
```

```
223   \cs_set:cpx { \char_generate:nn {"FFFF"} {12} \char_generate:nn {#2} {12} } {
```

```
224     __l_uni_math_is_integral_cp:wTF #2 { \DOTSI } { \DOTSB }
```

```
225     \use:c { \cs_to_str:N #1 op }
```

```
226     __l_uni_math_is_integral_cp:wTF #2 { \limits@ } { \slimits@ }
```

```
227   }
```

```
228 }
```

```
229
```

```
230 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathopen :nn } #1 #2 {
```

```
231   \token_if_eq_meaning:NNTF #1 \sqrt {
```

```
232     \cs_set:Npx \sqrtsign {
```

```
233       \Uradical \symlummain #2~
```

```
234     }
```

```
235     \cs_set:Npx \root ##1 \of {
```

```
236       \Uroot \symlummain #2~ { ##1 }
```

```
237     }
```

```
238   }{
```

```
239     \cs_set:Npx #1 {
```

```
240       \char_generate:nn {#2} {12}
```

```
241     }
```

```
242   }
```

```
243 }
```

```
244
```

```
245 \group_begin:
```

```

246 \cs_set:Npn \l_tmp_cs:n #1 {
247   \group_end:
248
249   \cs_new_protected:Npn \__l_uni_math__check_mup_helper:w ##1 #1 ##2 \q_mark ##3 ##4 \q_stop
250     ##3 {##2}
251 }
252
253 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathalpha :nn } ##1 ##2 {
254   \cs_set:Npx ##1 {
255     \char_generate:nn {##2} {12}
256   }
257   \exp_after:wN \__l_uni_math__check_mup_helper:w \token_to_str:N ##1 \q_mark \cs_set_eq:cn
258 }
259 }
260
261 \exp_args:No \l_tmp_cs:n {
262   \token_to_str:N \mup
263 }
264
265 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathfence :nn } #1 #2 {
266   \cs_set:Npx #1 {
267     \char_generate:nn {#2} {12}
268   }
269   \cs_set:cpx {l \cs_to_str:N #1} {
270     \Udelimiter 4 ~ \symlummain #2 ~
271   }
272   \cs_set:cpx {r \cs_to_str:N #1} {
273     \Udelimiter 5 ~ \symlummain #2 ~
274   }
275 }
276
277 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccent :nn } #1 #2 {
278   \cs_set_protected:Npx #1 {
279     \Umathaccent fixed 0 ~ \symlummain #2 ~
280   }
281 }
282
283 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathbotaccent :nn } #1 #2 {
284   \cs_set:Npx #1 {
285     \Umathaccent bottom~fixed 0 ~ \symlummain #2 ~
286   }
287 }
288
289 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccentwide :nn } #1 #2 {
290   \cs_set:Npx #1 {
291     \Umathaccent 0 ~ \symlummain #2 ~
292   }
293 }
294
295 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathbotaccentwide :nn } #1 #2 {
296   \cs_set:Npx #1 {
297     \Umathaccent bottom 0 ~ \symlummain #2 ~
298   }
299 }

```

```

300
301 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccentoverlay :nn } #1 #2
302   \cs_set:Npx #1 {
303     \Umathaccent overlay 0 ~ \symlummain #2 ~
304   }
305 }
306
307 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathover :nn } #1 #2 {
308   \cs_set:Npx #1 ##1 {
309     \mathop {
310       \Udelimiterover \symlummain #2 { ##1 }
311     }
312     \limits
313   }
314 }
315
316 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathunder :nn } #1 #2 {
317   \cs_set:Npx #1 ##1 {
318     \mathop {
319       \Udelimiterunder \symlummain #2 { ##1 }
320     }
321     \limits
322   }
323 }
324
325 \cs_generate_variant:Nn \exp_args:Ne {c}
326 \cs_new:Npn \UnicodeMathSymbol #1 #2 #3 #4 {
327   \use:c { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N #3 :nn }
328   {#2} {#1}
329 }
330 \input {unicode-math-table}
331 \cs_undefine:N \UnicodeMathSymbol
332
333 \cs_set_protected:Npn \triangle { \mathord { \bigtriangleup } }
334 \cs_set_protected:Npn \mathellipsis { \mathinner { \unicodeellipsis } }
335 \cs_set_protected:Npn \cdots { \mathinner { \unicodecdots } }
336
337 \clist_map_inline:nn {
338   \to \rightarrow,
339   \le \leq,
340   \ge \geq,
341   \neq \neq,
342   \bigcirc \mdlgwhtcircle,
343   \circ \vysmwhtcircle,
344   \bullet \smbllkcircle,
345   \mathyen \yen,
346   \mathsterling \sterling,
347   \diamond \smwhtdiamond,
348   \emptyset \varnothing,
349   \hbar \hslash,
350   \land \wedge,
351   \lor \vee,
352   \owns \ni,
353   \gets \leftarrow,

```



```

354 \mathring \ocirc,
355 \lnot \neg,
356 \longdivision \longdivisionsign,
357 \backepsilon \upbackepsilon,
358 \eth \matheth,
359 \dotsb@ \cdots,
360 \@cdots \cdots,
361 } {
362 \cs_set_eq:NN #1
363 }
364
365 \cs_set_protected:cpx { \char_generate:nm {"FFFF"} {12} ' ' } {
366 \prime_helper:w "2032~
367 }
368
369 \cs_set_protected:Npn \uproot #1 {
370 \__l_uni_math_uproot:w #1 \scan_stop:
371 }
372
373 \cs_set_protected:Npn \leftroot #1 {
374 \__l_uni_math_leftroot:w #1 \scan_stop:
375 }

```

Some fixes for amsmath: Since amsmath is defining `\leftroot`, `\uproot` and `\root` with non Unicode definitions, we need to hide our definitions and restore them afterwards. We define `\varGamma` to stop amsmath from trying to define greek letter variants.

```

376 \tl_const:Nn \c__l_uni_math_amsmath_cmds_tl {
377 \uproot
378 \leftroot
379 \iint
380 \iiint
381 \iiint
382 \dddot
383 \ddddot
384 \overleftrightarrow
385 \underrightarrow
386 \underleftarrow
387 \underleftrightarrow
388 \hat
389 \check
390 \tilde
391 \acute
392 \grave
393 \dot
394 \ddot
395 \breve
396 \bar
397 \vec
398 \mathring
399 \DOTSC
400 \DOTSI
401 \DOTSX
402 \DOTSB
403 \mdots@
404 }

```

```

405 \tl_const:Nn \c__l_uni_math_amsmath_cmds_defined_tl {
406   \prod
407   \coprod
408   \bigwedge
409   \bigvee
410   \bigcap
411   \bigcup
412   \bigodot
413   \bigoplus
414   \bigotimes
415   \bigsqcup
416   \root
417   \int
418   \oint
419   \overrightarrow
420   \overleftarrow
421 }
422 \hook_gput_code:nnn { package/amsmath/before } { . } {
423   \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_tl {
424     \cs_new_eq:cN { __l_uni_math_saved_ \cs_to_str:N #1 } #1
425     \cs_undefine:N #1
426   }
427   \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_defined_tl {
428     \cs_new_eq:cN { __l_uni_math_saved_ \cs_to_str:N #1 } #1
429   }
430   \cs_set:Npn \varGamma { \temporary_definition_do_not_use }
431 }
432 \hook_gput_code:nnn { package/amsmath/after } { . } {
433   \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_tl {
434     \cs_set_eq:Nc #1 { __l_uni_math_saved_ \cs_to_str:N #1 }
435     \cs_undefine:c { __l_uni_math_saved_ \cs_to_str:N #1 }
436   }
437   \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_defined_tl {
438     \cs_set_eq:Nc #1 { __l_uni_math_saved_ \cs_to_str:N #1 }
439     \cs_undefine:c { __l_uni_math_saved_ \cs_to_str:N #1 }
440   }
441   \cs_undefine:N \varGamma
442 }

```